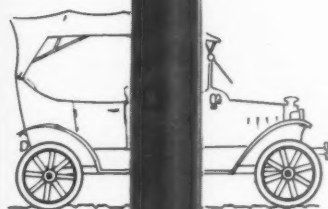


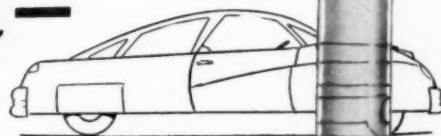
# PAINT and VARNISH

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

## BOTH are VEHICLES



but—



## WHAT A DIFFERENCE!

ORDINARY  
LIMED  
TALL OILS

NEWPORT  
T-GLO-8  
and T-GLO-8Y

## NEWPORT TALL OIL GLOSS OILS PALEST LIMED TALL OIL EVER SEEN

Newport now offers you Paler Tall Oil Gloss Oils than you have ever been able to purchase or make in the varnish kettle . . . and you CAN GET THEM in TANK CARS or in DRUMS.

Newport T-GLO'S dry right. The "bugs" are really removed. Saves you money on rosin, which is so costly today.

Why get all your drying from expensive bodied oils? Let the fatty acids in Newport's Tall Oil Gloss Oils show you a worthwhile oil saving.

You want easy grinding with good flow, minus objectionable sagging. Newport T-GLO'S bring these advantages. Write for a sample today.

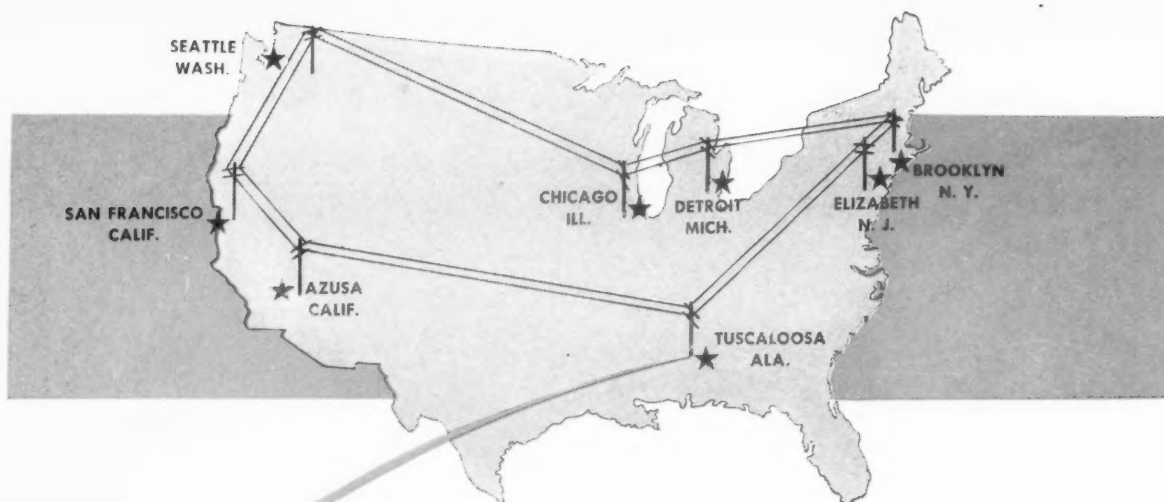


230 PARK AVENUE

NEW YORK 17, N. Y.

FEBRUARY

1931



When you deal with RCI, you are dealing with one of the world's largest producers of synthetic resins, chemical colors and industrial chemicals. RCI plants, located from coast to coast in this country and at all major manufacturing points abroad, constitute an array of manufacturing talents and skills constantly at work producing a wide range of chemical "raw materials" for industry. But no matter which of the RCI com-

ponents *you* use, you can always be sure of the very best—for RCI controls quality from raw material to finished product. This control, plus RCI's huge production and purchasing volume, assures you of maximum price protection. Add that RCI warehouses, field service laboratories and sales offices cover the country for your convenience and you can see . . . for the best in synthetic resins and chemical colors it pays to call on RCI!

**REICHOLD CHEMICALS, INC.**

General Offices and Main Plant, Detroit 20, Michigan



Other Plants: Brooklyn, New York • Elizabeth, New Jersey • South San Francisco and Azusa, California • Tuscaloosa, Alabama • Seattle, Washington  
Chicago, Illinois • Liverpool, England • Paris, France • Sydney, Australia • Sassenheim, Holland • Naples, Italy • Buenos Aires, Argentina  
Hamburg, Germany • Toronto, Canada • East London, South Africa • Osaka, Japan • Vienna, Austria

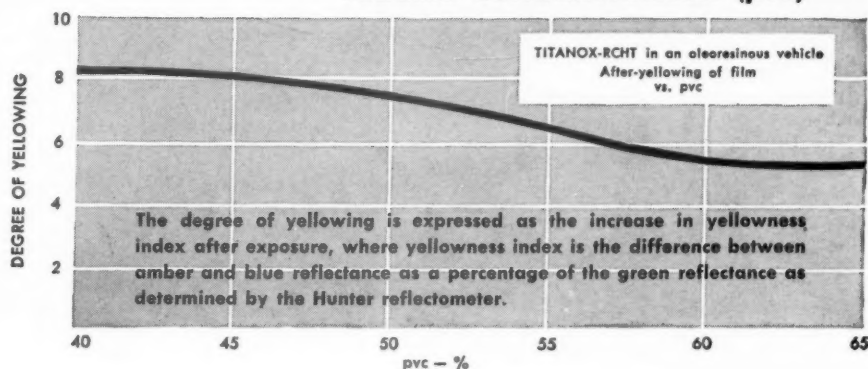
**SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS**

# Technical Tips from Titanox



**Q. HOW MANY FACTORS GOVERN AFTER-YELLOWING OF WHITE COATINGS?**

**A. AT LEAST SIX—INCLUDING PIGMENT VOLUME CONCENTRATION (pvc)**



The yellowing of white organic coatings with age and exposure to light is determined by a number of factors in formulation, especially:

1. Type of resin
2. Types of oils
3. Processing of resins and oils
4. Driers and their concentration
5. Type of pigment
6. Pigment volume concentration (the percent pigment by volume of the total non-volatile)-pvc.

All of the factors governing after-yellowing have been thoroughly studied in the best utilization of the TITANOX pigments which reduce after-yellowing of white coatings.

In a given white pigment-vehicle system, other factors being equal, after-yellowing is decreased as pigment volume concentration (pvc) is increased.

The above illustrative chart shows how the degree of yellowing was decreased as the pvc of TITANOX-RCHT (rutile-calcium pigment) was increased in an oleoresinous vehicle.

The well known superior resistance to after-

yellowing of flat wall paints pigmented with TITANOX-RCHT is suggested by the lesser yellowing at high pvc—55% to 65%. In this case, practically no reduction in after-yellowing is gained by increasing pvc to the maximum of 65%. Such excessively high pigmentation may cause defects such as poor enamel hold-out and poor cleanability.

Increase in after-yellowing at lower pvc approaching that of high gloss finishes is in line with experience. It suggests that some vehicle systems though not suitable in after-yellowing for enamels, are satisfactory for flats at higher pvc, especially when other desirable properties such as adhesion and cleanability are highly developed.

Our Technical Service Department is always willing to help you achieve resistance to after-yellowing and other properties desired in your coatings. Titanium Pigment Corporation, 111 Broadway, New York 6, N.Y.

8819

**TITANOX**  
*the brightest name in pigments*

**TITANIUM PIGMENT CORPORATION**  
Subsidiary of NATIONAL LEAD COMPANY

PAINT AND VARNISH PRODUCTION, FEBRUARY 1951





***users everywhere applaud***

**the  
quality of  
Cyanamid's  
Rezyl<sup>®</sup>  
Resins**

...and behind that applause are plenty of reasons. Users of alkyds know that the quality of REZYL Resins is tops, because of Cyanamid's carefully controlled manufacturing methods. They know too, from long experience, that this quality is backed by uniformity—there's no worry about variations that spoil formulations when REZYL Resins are used.

And that isn't all. Customers like the Cyanamid extras they receive... helpful cooperation from Cyanamid's trained technical service representatives... extensive research by Cyanamid's laboratories that improves raw materials and develops new ones... all these and many more make REZYL Resins a favorite with experienced finishers.



**AMERICAN *Cyanamid* COMPANY**

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.



# PAINT and VARNISH *Production*

Formerly PAINT and VARNISH PRODUCTION MANAGER  
(Established in 1910 as The Paint & Varnish Record)

## NEXT ISSUE

Prevention of Corrosion Through the Use of Protective Coatings will be the theme of the March issue of Paint and Varnish Production. In this connection, we have scheduled several interesting articles on the various aspects of coating protection. These include such important factors as surface preparations; influence of the vehicle on the effect of coating materials; and specialized coatings for steel in water and subsoil installations.

Published Monthly by  
Powell Magazines, Inc.  
Executive and Editorial Offices  
855 Ave. of the Americas  
New York 1, N. Y.  
BRyant 9-0499

JOHN POWELL, *Publisher*  
ANTHONY ERRICO, *Editor*  
EDWARD R. DRAKE  
*Associate Editor*  
A. L. LYNCH  
*Circulation Manager*  
WILLIAM T. DULAC  
*Production Manager*  
DUNCAN P. MACPHERSON  
EDWARD M. LYNCH  
JOHN F. HYDE  
*Advertising Representatives*  
McDONALD-THOMPSON  
*West Coast Representatives*

VOL. 41

FEBRUARY 1951

No. 2

## FEATURES

Mildewing of Paints and Its Prevention, by <i>Richard E. Vicklund and Milton Manowitz</i> .....	8
Instrumentation, by <i>J. Procopi</i> .....	12
Vinyls for Surface Coatings, by <i>Walter J. Hanau</i> .....	17
Hot Lacquer Process .....	21

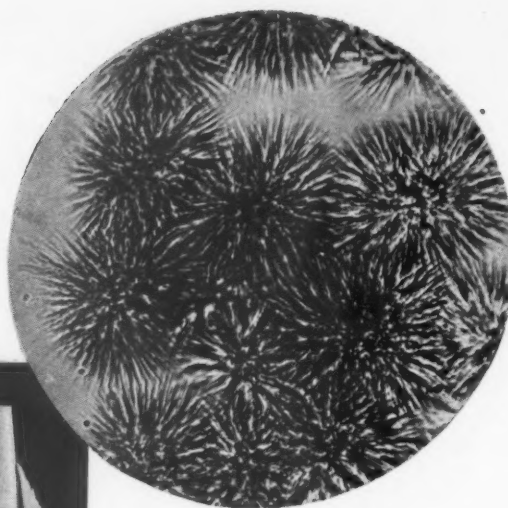
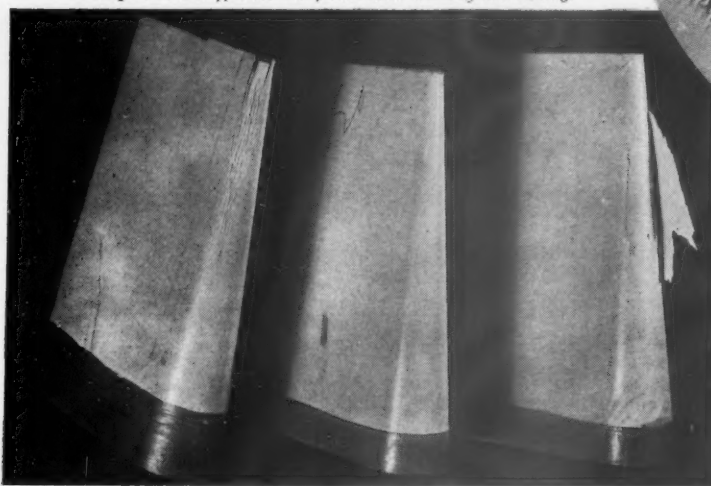
## DEPARTMENTS

Comment .....	7
Patents .....	27
New Products .....	29
News Digest .....	33
Books & Reports .....	37
Technical Bulletins .....	38
Abstracts .....	41
Calendar of Events .....	42
Advertiser's Index .....	42

PAINT and VARNISH PRODUCTION is published monthly at 10 McGovern Ave., Lancaster, Pa., by Powell Magazines, Inc. John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second-class matter, November 16, 1949, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879. Subscription rates: United States and Possessions, \$3.00 a year, \$5.00 for two years, \$10.00 for five years. Canada, \$4.00 a year. Pan American Countries, \$4.00 a year. All other countries \$8.00. Editorial and business office: 855 Avenue of the Americas, New York 1, N. Y. BR-9-0499.

# "lead" plasticizes a paint film

Center: Typical "lead"-containing paint demonstrates good flexibility—bends without cracking. Left and Right: Too brittle and lacking in flexibility, these two paints show cracking and flaking.



Photomicrograph showing the meshing of the spiny lead soap crystals.

—that's why  
house paints  
containing "lead"  
remain tough  
and flexible

## "LEAD" LENGTHENS THE LIFE OF PAINT BECAUSE:

It **Stabilizes**—neutralizes acidic compounds resulting from the decomposition of the vehicle—prevents the film from becoming soft or liquefying.

It **Plasticizes**—forms lead soaps which increase film flexibility.

It **Strengthens**—flexible, spiny crystals in lead soaps mechanically reinforce the film and increase elastic strength.

It **Resists Water**—paint films with an optimum lead pigment content absorb only a small fraction as much water as they otherwise would.

Without a plasticizer—an agent that insures prolonged flexibility—paint, like any other plastic, would soon become hard and brittle. That's one of the reasons why white lead pigments are vital to multi-pigment house paints.

Lead soaps, formed by the reaction of lead pigments with the vehicle, are ideal plasticizers. They prevent cracking under normal stresses—allow the paint film to adhere tightly to the surface it protects and at the same time stretch and contract with any dimensional changes of that surface.

White lead pigments permit the formulation of paints which are not only tough and flexible initially but *remain* so throughout their entire life.

Use "lead" in your paints. And use enough of it to take full advantage of the many desirable qualities that white lead pigments impart—qualities which mean better paints, greater consumer satisfaction and larger sales.

For detailed information on the most effective use of "lead" in your paints... write to *Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.*



# Editorial Comment

## Ingenuity

THE Socony-Vacuum Oil Company has recently announced that a new type of paint which changes color automatically with an increase in temperature is of great importance in the study of air-cooled internal combustion engines. According to the announcement, this paint is being used by the Socony-Vacuum Technical Service Laboratory in Brooklyn where technicians keep a record of the color bars caused by different temperatures on a painted engine.

Fifteen basic shades are possible with this paint, and are used in determining proper locations for thermocouples to measure the internal heat while an engine is in operation. Without prior application of one of the basic fifteen shades, the placing of thermocouples may distort air currents so as to affect the accuracy of measurements. Some of the fifteen basic paints are capable of six complete alterations in color as the temperature rises. For example, one such paint is originally violet blue at room temperature; becomes bright green at 311 deg. F; olive green at 446 deg. F; dark gray at 545 deg. F; light gray at 554 deg. F; light brown at 572 deg. F and buff at 644 deg. F. Socony experts say that the paint has proved to be of considerable value in testing heat transfer qualities of lubricants as well as the efficiency of air-cooling arrangements. Nothing seems impossible for the paint formulator to-day. Just name it and they'll get it for you.

## More Titanium

A NEW process for smelting titanium ore from Canadian deposits located at Lac Tio has been inaugurated. At Sorel, Quebec one of five electric arc furnaces is processing titanium ore from ilmenite deposits, estimated at 125 million tons. This project is operated by the Quaker Iron & Titanium Corp., which is owned two-thirds by Kennecott Copper and one-third by the New Jersey Zinc Co. Cost for this undertaking is placed at over 30 million dollars.

Exploitation of these deposits will eventually mean that the United States will not have to depend on overseas sources of titanium materials. Full production is expected by the middle of 1952. This plant will then be able to handle about 550,000 tons of ilmenite ore annually which will yield about 200,000 tons of iron ore and 250,000 tons of slag containing 70 percent titanium dioxide. This represents about 56 percent more than the present annual titanium output of National Lead at Tahawus, N. Y. In addition, reserves of titanium dioxide at Allard Lake top those of Tahawus by some 37 million tons. It looks like we'll get enough titanium for all, but it'll take a year or so.

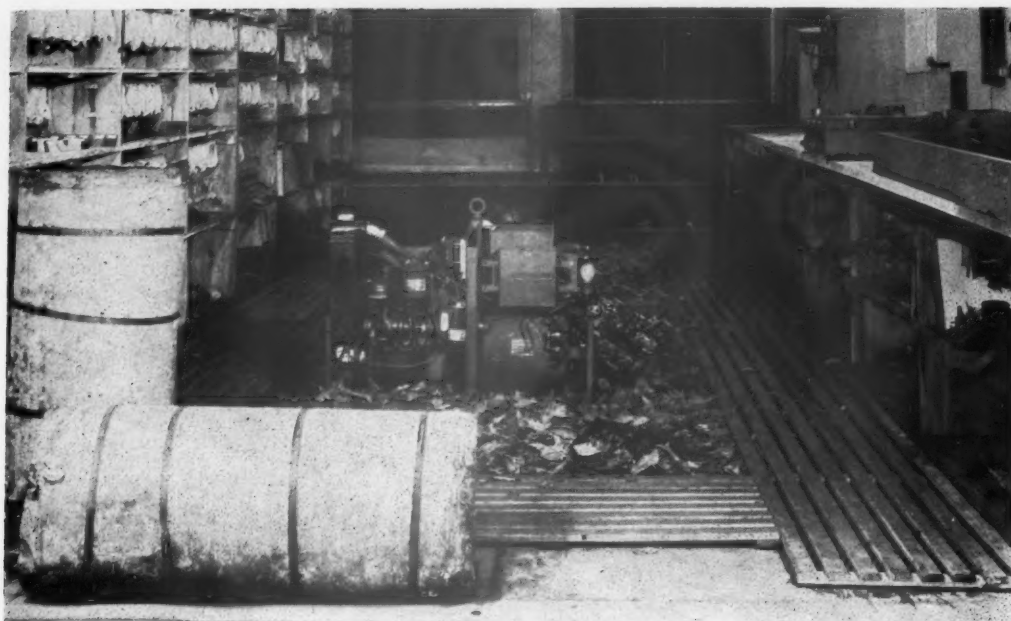
## 1951 Paint Conventions

IN a joint statement, President Joseph F. Battley of the National Paint, Varnish and Lacquer Association and President Robert D. Bonney of the Federation of Paint and Varnish Production Clubs have announced that the 1951 conventions of their respective organizations will be held in Atlantic City, with headquarters at Chalfonte-Haddon Hall.

The NPVL Ass'n. will hold their 63rd convention October 29, 30, and 31, while the Federation will hold their annual meeting on Nov. 1, 2 and 3. The Paint Industries' Show will open on Wednesday Oct. 31 and close Saturday Nov. 3.

Everything will be done to make the 1951 meetings of historic importance. The business meetings will be planned and presented in keeping with the conditions and problems of the day, with particular reference to the National Emergency Program of Mobilization and conditions confronting the industry at that time.

Mark these dates on your calendar, now!



Interior view of tropical testing chamber.

AMONG the numerous, incapable deteriorating factors which account for huge losses of materials and equipment are fungi and moisture. The humid, warm tropical areas are particularly conducive to this type of deterioration. However, fungi are present throughout the world and will grow whenever a suitable environment exists. A paint, applied to a surface, such as green lumber or damp masonry, may mildew regardless of geographical location. The moisture content of the paint film and substrate, and the humidity of the atmosphere are of paramount importance to mold growth. Warm temperatures enhance the growth of many fungi but are not essential; mold growth on paints in cold storage rooms is a common occurrence.

Fungi are small plants which are widely distributed on the earth and found in abundance in soil, air and water. The spores, or reproductive bodies of fungi, are microscopic in size, float freely in air, and vary widely in their longevity. When a spore germinates, it sends out thread-like tubes which branch and rebranch to form the fuzzy growth commonly called mold or mildew.

This paper was presented at the third Symposium of Varnish and Paint Chemistry sponsored by The College of Engineering of New York University held on Nov. 18, 1950.

## Mildewing of Paints And its Prevention

By

RICHARD E. VICKLUND and MILTON MANOWITZ  
Engineer Research and Development Laboratories  
Fort Belvoir, Va.

Fungi destroy the material on which they grow in obtaining their food requirements. In a paint film, the oils particularly provide a good carbon source. Although the paint film is physically affected by mildew, the practical significance of this physical deterioration of the film has not been determined.

Of far greater importance than deterioration of the film, is the mere presence of mildew which destroys the decorative value of the paint. Figures 1, 2, and 3 illustrate condi-

tions observed in buildings at Ft. Sam Houston, Texas. Figure 1 is the ceiling of an inclosed swimming pool; the ceiling is composed of wood, coated with a light gray, flat, oil paint. In Figure 2, the ceiling of a shower room, a white enamel containing mercuric chloride was applied to the concrete ceiling; mildew developed within 60 days. Figure 3 shows a porch ceiling and pillars heavily overgrown by mildew; the porch was shaded by large cottonwood trees.



### Identification

THE examination of painted structures to determine whether fungi are present or not is often a difficult task. One of the major difficulties is to determine whether black or brown spots on the paint are fungi or just dirt. Goll and Coffey (5) have discussed this problem, and show that while microscopic examinations often provide the answer, instances occur which baffle the skilled worker. Figure 4 illustrates the appearance of a paint film which has been attacked by fungi. The painted panel shown was cut from the side of a wooden guard post along a roadway. To the untrained eye, the black spots could be readily identified as dirt. However, under the microscope, one of the black spots shows the typical characteristics of the branched mycelium of a fungus. It is of interest that the mildew is heavier at the top of the panel where the end grain of the wood was exposed to the atmosphere, permitting greater accumulation of moisture in this area.

The fungi most frequently isolated from paints were once believed to be predominantly species of the *Aspergillus* and *Penicillia* (2, 4); however, recent studies in New Jersey (5), Florida (6), and the authors' examination of mildewed paints at Ft. Sam Houston, Texas, and Ft. Belvoir, Virginia, show that, while these organisms are often found, the genus *Pullularia* is the most frequently occurring fungus on paints. These findings are of considerable importance in the laboratory studies of fungicidal paints because of the variations in the tolerance of different molds to fungi-

cidal compounds; a paint which prevents the growth of one fungus may not affect another nearly so seriously.

Inadequate laboratory test methods have been a serious handicap to the development of fungicidal paints and probably accounts for the variety of recommendations that exist for the solution of the problem. As previously mentioned, the selection of appropriate test organisms is essential. In work of this laboratory, *Aspergillus oryzae* was selected after studying many of the fungi isolated from mildewed paints (9); it was found that this organism responded to various fungicidal paints in a manner similar to *Pullularia*, the fungus most frequently encountered on paints, and is a more stable and easily-handled organism under laboratory conditions. Usually, two or more organisms are used to guard against erroneous conclusions caused by the variations among different fungi.

In addition to the problem of the test organism, the selection of a substrate to which the test paints can be applied is critical. Wood panels, even though carefully selected from a single timber, may vary widely in physical properties which have a direct influence on the mildew resistance of a paint applied to it. Seeking a more uniform substrate, investigators have tried glass and metal panels. However, it is difficult to get fungi to grow readily on painted glass or metal, probably because the materials will not adsorb moisture which is essential for mold growth. In the method used at this laboratory, filter paper is used since it is uniform in composition, will absorb moisture when coated with a paint,

and permits a rapid growth of mildew.

### Test Methods

IN conducting the test, the painted filter paper samples are placed on an agar medium contained in Petri plates and then inoculated with spores of the test organism. After an incubation period of 7-14 days, the samples are examined visually and rated 1, 2, 3 or 4, depending upon the amount of mildew; 1 means no growth, 2 slight, 3 moderate, and 4 heavy growth. The details of the procedure were published previously (8).

While the procedure described above has proved useful for screening and specification purposes, there is a definite need for field tests to evaluate the better methods of mildew control. Test fence exposures and the painting of buildings is frequently resorted to. However, these are time consuming procedures and this laboratory uses a third method which is midway between the accelerated laboratory method and the field tests. In this procedure, carefully-selected, painted, wood panels are exposed in a large tropical chamber where a warm, humid atmosphere is maintained and in which a daily cycling of the temperature and humidity causes condensation of moisture on the panels (1). The interior of the chamber is shown on page 8. The atmosphere of the chamber is heavily laden with fungus spores which are continually inoculating exposed materials in a natural manner. Correlation studies on paints indicate good agreement with field exposures and the time factor is reduced appreciably.

Fig. 1. Mildewed ceiling of swimming pool.



Fig. 2. Heavy mildew growth in shower room.





Fig. 3. Mildewed house porch.

#### Prevention

IN THE development of preventive measures, proper formulations and painting procedures have proven helpful in reducing the incidence of mildew. In regard to proper formulation, it has long been known that paints which dry rapidly to form hard films with low water absorption characteristics are more mildew resistant than soft, slow-drying films. The use of zinc oxide pigments provides mildew resistance if used in adequate amounts. Zinc oxide is somewhat toxic to fungi and often gives a harder film (11). While proper formulation improves mildew resistance, it, by itself, is not adequate to meet the requirements for most applications; mildew will occur on the best of formulations and the use of fungicides in the paint is essential.

The literature on fungicides for use in paints contains numerous recommendations for the use of various compounds (3, 7, 10), and recently the authors reported on the fungicidal properties of some 150 compounds which included all the commonly used fungicides in addition to many new compounds (9). In this work, the laboratory test method, previously described, was used. The more effective paints were also exposed in the Tropical Chamber and Panama where corroboration of results was obtained.

Outstanding among these results is the superior fungicidal activity of copper 8-quinolinolate. While mold growth was completely prevented at a concentration of 0.5%, 1.0% or more was required of the other compounds to approach this level of effectiveness. However, the use of this compound in paints is limited by several factors. Its color is brown-green, which limits its use to the dark colors; where close control is exercised over the color, pigment reformulation may be required. The solid copper 8-quinolinolate, presently under discussion, is insoluble in paints and, although no difficulty was encountered in dispersing the compound by hand in a ready-mixed paint, it is probably preferable to incorporate the fungicide during the milling of the paint.

Several other metal salts of 8-hydroxyquinoline were prepared and tested in an attempt to overcome the color disadvantage of the copper salt; however, none of them was found to be as effective as the copper salt. Compared with one another, the manganese, bismuth, mercury, and zinc salts demonstrated approximately equal activity; the cadmium and magnesium salts showed much lower activity. A phenyl mercury salt showed activity about equal to that of the other phenyl mercurials discussed in the following paragraph and probably owes its activity to the phenyl mercury portion of the molecule rather than the quinolinolate radical.

The results obtained with the various salts of 8-hydroxyquinoline are of particular interest since the copper salt is not only the most effective, but is one of the very few copper organic compounds which have been effective as paint fungicides.

#### Other Compounds

MERCURY compounds tested included several phenyl mercurials, pyridyl mercurials, and mercuric chloride. Of these, the phenyl mercurials, as a group, proved to be the most effective; pyridyl mercuric chloride approximated the activity of the phenyl mercurials, but the other pyridyl mercurials (acetate and stearate) were much less effective. Mercuric chloride, which has been used frequently in paints, is considerably less effective than the phenyl

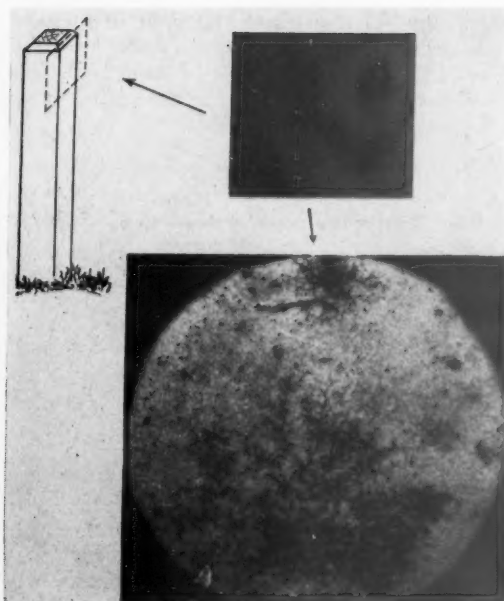


Fig. 4. Microscopic photo of painted film attacked by fungi. Film taken from mildewed post.

mercurials; 6 percent, based on the total weight of the paint, was required to provide the activity of 0.5 to 1.0 percent of most of the phenyl mercurials. Merthiolate demonstrated considerable activity, but additional work at lower concentrations was not undertaken because of the adverse effects of the compound on the drying properties of the paint.

Most of the phenyl mercurials showed approximately equal fungicidal activity when evaluated on the basis of the concentration of the compound in the paint; therefore, it follows that the mercury content of these compounds is no guide to their relative merits, since some compounds contain twice as much mercury as others.

The chlorinated phenols, such as tetrachlorophenol, were found to be less effective than the organic mercurials. It was in this group of compounds that the tolerance of various molds to the fungicides was most apparent. When *Aspergillus oryzae* was used as the test organism, 6% of tetrachlorophenol was required to pass the laboratory test whereas 2% passed when *Aspergillus niger* was used.

The relative merits of the more commonly used fungicides and several new compounds are summarized in Table 1. The newer promising compounds, such as the copper salt of nitrosophenylhydroxylamine, are currently undergoing more extensive tests to determine their usefulness as paint fungicides.

While improved fungicides are under development, significant advances can be made with the use of existing compounds and techniques. Recently it has been shown that the addition of zinc oxide to red barn paints improves their mildew-resistance (12). With one of the better fungicides used in combination with the zinc oxide a much greater improvement can be made. Using a red barn paint containing 2.0% (based on total weight of paint) of copper 8-quinolinolate, a painted panel showed slight evidence of mildew after 8 months' exposure in the Tropical Chamber whereas a mixed pigment paint containing zinc oxide, in addition to the same amount of copper 8-quinolinolate, has not mildewed in 18 months under the same conditions. The use of combinations of fungicides has also proved beneficial, e.g., copper 8-quinolinolate has been combined with tetrachlorophenol to provide effective control and to decrease the amount of the copper salt used so as to minimize its effect on the color of the paint. Fungicidal combinations can also be expected to afford protection against a wider range of fungi than any single compound.

In addition to laboratory studies such as those described above, the weathering resistance of fungicidal paints to determine the effects of the fungicides on the paint as well as the durability of the fungicide to atmospheric conditions is being examined. Numerous panels have been exposed

in Florida, New Mexico, Virginia, and in accelerated weathering machines and subsequently exposed in the Tropical Chamber to determine their mildew resistance. While the results are incomplete, there are indications that the better compounds are not seriously affected by the exposures; in some instances, the weathered panels appear to be more mildew resistant than similar unexposed panels.

#### New Approach

FROM another investigation, certain findings concerning the mildewing of paints have opened a new approach for the development of improved fungicidal paints. It is of importance to know where the fungi that appear on a paint come from, i.e., did the mildew grow from the substrate, through the film, to the surface, or did the fungus spores fall on the painted surface from the atmosphere and grow inward; it is probable that both occur with the latter being of greatest importance. In studying this question, a paint was applied to two sets of wood panels, one of which was heavily infected with fungi. After drying, the panels were exposed in the Tropical Chamber where mildew readily develops. Both sets of panels mildewed in about the same period of time indicating that painting over infected areas did not greatly increase the formation of mildew on the paints. If the two panels had varied widely in their moisture content at the time of painting the wetter panel would probably have mildewed more rapidly. In another test, a set of panels were primed with a fungicidal wood sealer and subsequently coated with a non-fungicidal paint whereas another set was coated only with a fungicidal paint. The latter resisted mold growth long after the former failed, indicating that a fungicidal substrate affords but little protection to a top coat of paint. This was demonstrated in tests in a food plant also (12). A fungicide incorporated in the undercoat permitted mold growth on the top coat whereas when the fungicide was used only in the top coat considerably less mildew developed; in neither case was the mildew as heavy as in the case where no fungicide was used. While sterilizing of the surface to be painted and

TABLE I  
Relative Efficiency of Several Fungicides  
Used in Iron Oxide-Linseed Oil Paint  
Test Organism—*Aspergillus Oryzae*

Compound	Conc., % by Wt.				
	0.5	1.0	2.0	4.0	6.0
Copper 8-quinolinolate	1.0*	1.0	—	—	—
Phenyl mercuric salicylate	2.1	1.5	1.2	—	—
Mercuric chloride	—	—	2.8	2.2	1.7
Tetrachlorophenol	—	—	3.0	2.4	1.3
Tetrachlorophenyl acetate	—	—	2.0	—	—
Salicylanilide	—	—	3.0	1.4	1.0
Copper salt of N-nitroso phenylhydroxydamine	3.0	1.3	1.0	—	—
1-(4-chlorophenyl)2,4-dimethyl-3-nitrosopyrazole	3.8	3.0	1.2	—	—
2,2'-dipyridyl	—	—	1.7	—	—
2-nitroso-1-naphthol	0	0	4.0	1.3	—
Selenium diethyldithiocarbamate	3.0	1.0	—	—	—

\* Numbers indicate extent of mildew:

- 1 = no growth.
- 2 = slight growth.
- 3 = moderate growth.
- 4 = heavy growth.

(Turn to page 26)



IN REMOTE antiquity, prehistoric man recorded some of his activities in color on the walls of caves, thereby marking the humble birth of the surface coating industry. The crude paints of the cave man were probably various colored earths or clays suspended in water; the first known varnish contained beeswax as the film forming material. Today, the variety of surface coating materials is so great that a single manufacturing plant may consume as many as 2000 different raw materials and produce ten times that number of surface coatings.

The advent of many new synthetic resins has supplied the impetus for the rapid expansion that has been made in recent years. Beginning with the use of modified phenolics in 1926, many varied types of synthetic resins have been utilized in varnish and paint production, and these have played a major role in the phenomenal growth of the industry. This rapid expansion has been augmented by the use of recording and controlling instruments, thus effecting accurate control of the reaction kettle.

#### Varnish Composition

A VARNISH may consist merely of a solution of a resin in a volatile solvent (spirit varnish) or it may be a solution of a resin in a bodied oil, to which thinners and driers have been added (oil varnish). A large quantity of the oil varnishes produced are used as the pigment vehicles in the production of paints.

The type of resin that is used in each varnish depends upon the properties or characteristics that it is desired to impart to the final product. Generally, the alkyd resins are most widely employed.

Of the available drying oils, the more widely used are linseed, dehydrated castor and soybean oil. Oils and fatty acid derivatives such as china wood, oticica, perilla, fish and tall oils are used to a lesser extent. In many cases, mixtures of any of the above oils are used for special effects.

Bodilying of these raw oils consists essentially of dimerizing the unsaturated olefins by the application of heat. The operation is carried out in vacuum in an inert atmosphere. The net result is an activation of the unsaturated double bond, so that the



Fig. 1. Typical gas-fired varnish kettle, showing the burner refractories.

## *Instrumentation*

# Results in Uniform Reproducible Varnish

By J. PROCOPI

Minneapolis-Honeywell Regulator Co.

Industrial Div.

Philadelphia, Pa.



oil will polymerize in the presence of air, to produce a tough film.

To catalyze this air drying and thus shorten the drying time of the varnish, any of several metallic salts may be incorporated into the varnish. The most commonly used driers are the lead, cobalt or manganese naphthenates.

#### Varnish Manufacture

**V**ARNISHES are cooked in closed autoclaves, and where optimum results are desired, automatic temperature controllers and auxiliary equipment are used to control the reaction.

Methods of heating these kettles include direct and indirect firing by gas and oil burners, high resistance electrical heating coils, steam, hot oil circulating systems and Dowtherm units. Since natural gas is easier to use than other media, most manufacturers prefer the gas-fired kettles.

Fig. 1 shows a typical resin kettle utilizing a Burdett gas system. In this system, the burner refractories are heated to approximately 2300° F through the combustion of a gas-air mixture against the surface of the brick. At this temperature, a high percentage of the energy output of the burner is radiant heat. The characteristics of this type of heating permit fast pick up of temperature in the varnish kettle.

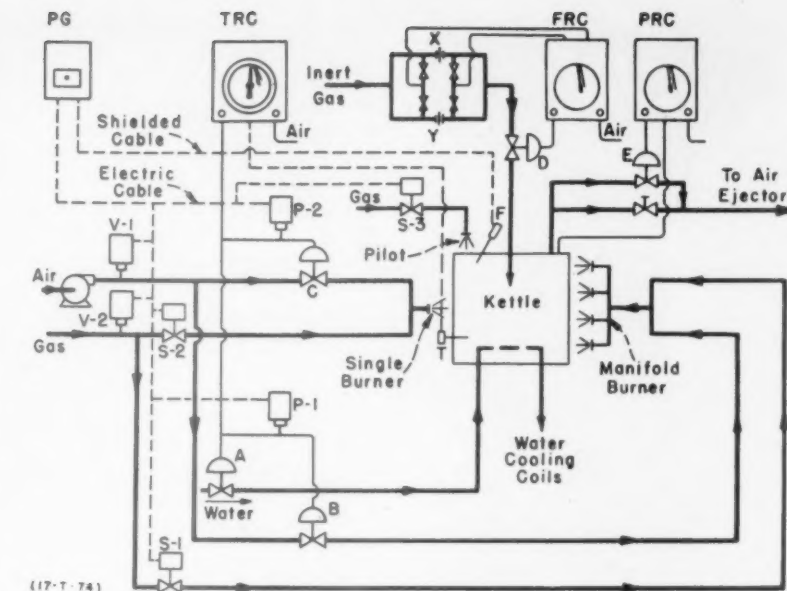


Fig. 2. Schematic diagram of kettle control system. Legend: Recording Temperature Controller (TRC); Recording Flow Controller (FRC); Recording Pressure Controller (PRC); Protectoglo Combustion Safeguard Relay (PG); Diaphragm Motor Control Valves (A,B,C,D,E); Flame Electrode (F); Pressuretrol (P); Solenoid Gas Valves (S); Thermocouple (T); Vaporstat (V).

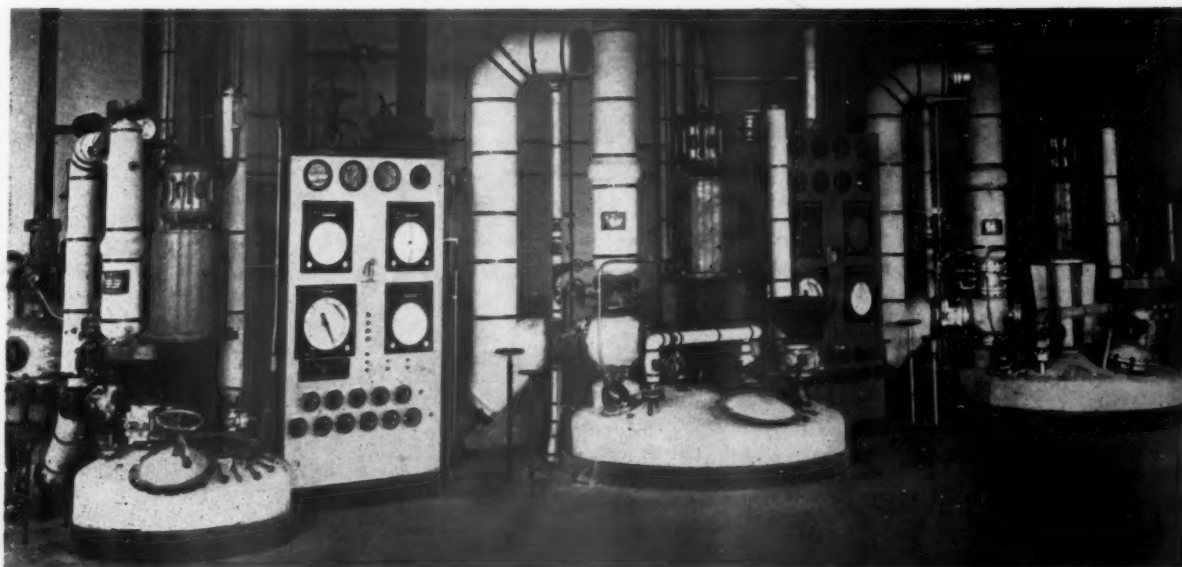
In the preparation of the varnish, the resin is first melted in a small amount of oil. After a short heating period, the remainder of the oil is added and the reaction temperature is maintained at the desired control point. Throughout, an atmosphere of CO<sub>2</sub> or a mixture of N<sub>2</sub> and CO<sub>2</sub> is used to inhibit oxidation of the oils, as well as to control foaming. The end point is determined on the basis of acid number and viscosity. After

completion of the cook, the varnish is cooled and discharged from the kettles into the thinners.

#### General Control Picture

**R**EFERENCE to the accompanying schematic diagram of a typical single kettle control system (Fig. 2) provides a general picture of the variables controlled and the methods employed to effect control.

Figure 3. Unit control panels shown adjacent to top of varnish kettles.



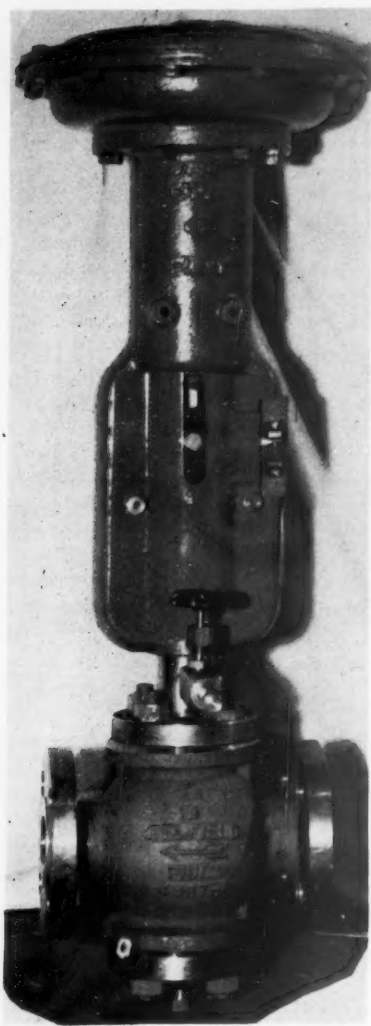


Fig. 4. High lift diaphragm motor control valve.

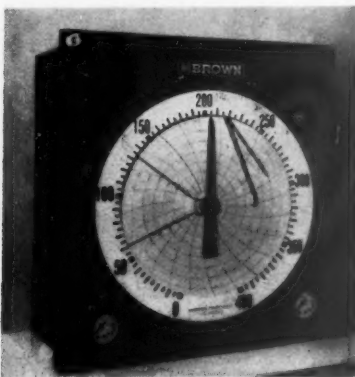


Fig. 5. Brown ElectroniK Controller.

For convenience of operation, the control instruments and auxiliary equipment are mounted on a panel adjacent to each kettle (Fig. 3). In addition, a central panel may be located in a remotely placed control room for central logging of kettle temperatures and other variables.

Basically, as outlined earlier, the process involves a rapid heating of the varnish until a desired point is reached. At this control point, the temperature is maintained by either allowing cold water to circulate through the cooling coils, or by adding additional heat, as the case may be. Mechanical stirring of the batch is provided, and the bubbling of inert gas through the material helps to agitate the mass, thus tending to maintain a uniform temperature throughout.

#### Combustion Control

A COMBUSTION control system is used on gas burners, so that the gas will be automatically shut off should there be a failure of (1) gas flame, (2) combustion air blower, (3) gas pressure, or (4) electric or air power supply.

As shown on the schematic diagram, a Protectoglo relay (PG) is electrically interlocked with pressure switches so that on flame failure the relay can de-energize the circuit to the three solenoid gas valves, to cause them to close.

In the same manner, if either the air blower or gas supply fails, pressure switches V1 and V2 will cause the gas valves to close. The solenoid valves are spring closing type, so that they fail safe in the event of electric supply failure. Instrument air supply failure also results in a closing of the solenoids through pressure switches P1 and P2.

#### Control of Inert Gas Flow

BY MEANS of the double orifice arrangement shown on the schematic diagram, the rate of inert gas flow to the kettle is closely controlled within limits of from one to fifty pounds per hour. The instrument that is used is a conventional flow recorder with wide band proportional control, and the final control element is a high lift diaphragm motor valve (Fig. 4) mounted in a half inch gas line to the kettle.

In operation, the top orifice (X)

is used for controlled gas flows below five pounds per hour. For flows above this value, the block valves to X are closed and the lower two block valves are opened, thus routing the flow through the bottom orifice (Y).

In calculating the actual flow of gas, the operator multiplies his chart reading by 0.01 when the upper orifice is in use, and by 0.1 when the lower orifice is open. The chart range is 0 to 500.

#### Temperature Control

A PNEUMATICALLY operated circular chart ElectroniK recorder with wide band proportional control is used to control the reaction temperature (Fig. 5). The thermocouple is inserted into the bottom of the kettle, while the output instrument air pressure is connected to three high lift diaphragm motor control valves. One valve (A) is installed on the line supplying water to the cooling coils; the other two valves (B and C) are installed in separate combustion air lines connected to the manifold and single gas burner heating the kettle.

The arrangement provides a means of changing the heat supply capacity. During the period when the batch is being brought to cook temperatures, both burners are in operation. As the control point is approached, the manifold burner is extinguished and the single burner brings the batch up to the control point. At this point, the single burner goes out, and the water valve opens, allowing cooling water to circulate through the coils.

To effect the above operation, this system is designed so that all burner valves are open when the instrument is delivering 15 psi air to the diaphragm motor control valves. As the temperature of the varnish rises, the instrument outlet air pressure drops, until at 10 psi an electrical contact in pressure switch P1 opens, thus breaking the circuit to the solenoid valve S1 which feeds gas to the manifold burner. This shuts off the gas flow to this burner. Similarly as the temperature continues to rise the instrument outlet air pressure continues to fall, until at the control point, the pressure reaches a value of

(Turn to page 25)



He's not  
just  
dreaming!

...There is one vehicle for flat and semi-gloss paints that combines *all* these advantages — It's AROFLAT 3025. If you're not already using it, write now for complete technical information on this new PURE ALKYD RESIN.



*you can rely on U. S. I.*

**INDUSTRIAL CHEMICALS, INC.**

60 East 42nd Street, New York 17, N. Y.

*Branches in all principal cities*

# For Light Color Alkyds!

## HARDESTY offers



HARDESTOIL 15	
Titre .....	(73.4 - 78.8° F) 23.0 - 26.0° C
Color-Gardner Standards 1933 .....	3 - 5
Iodine Value (Wijs) .....	minimum 125
Free Fatty Acid (as oleic) .....	98 - 100%
Acid Number .....	195 - 199
Saponification Value .....	196 - 200
HEAT STABILITY: After heating to	
235° C for five hours with CO <sub>2</sub>	
Color-Gardner Standards 1933 .....	5 - 7
HARDESTOIL 16	
Titre .....	(42.8 - 48.2° F) 6.0 - 9.0° C
Color-Gardner Standards 1933 .....	3 - 5
Iodine Value (Wijs) .....	minimum 135
Free Fatty Acid (as oleic) .....	96 - 98%
Acid Number .....	191 - 195
Saponification Value .....	192 - 196
HEAT STABILITY: After heating to	
235° C for five hours with CO <sub>2</sub>	
Color-Gardner Standards 1933 .....	5 - 7

## 2 ALKYD RESIN GRADES

## of Soya Bean Fatty Acids

The light color of every drum of Hardestoil 15 and Hardestoil 16 proves their superior advantages in alkyd resins for protective coatings. Hardestoil 15 is specially formulated for use in production of rapid-drying, high gloss, durable primers, surfacers, outside and interior enamels, finishes and water emulsion paints. Hardestoil 15 and Hardestoil 16 bring new adhesive and weather-protective values to your coating, and offer increased protection economically. Where high iodine and low titre are requisites, specify Hardestoil 16.

### EACH LOT LABORATORY-TESTED

Because even precise controls do not always insure quality in alkyd manufacturing, W. C. Hardesty Company applies special laboratory tests to every lot of Hardestoil 15 and Hardestoil 16, to be sure clarity and color are consistently superior.

### YOU SAVE MONEY

Send for sample and learn how you can reduce your costs.  
Available in 55 gallon special lined drums.



Send for new Hardesty 24-page Fatty Acid Specification Catalog

41 EAST 42nd STREET, NEW YORK 17, N. Y.

ESTABLISHED 1926

LOS ANGELES, CALIF.

FACTORIES; DOVER, OHIO

TORONTO, CAN.



# Vinyls

## For Surface Coatings

By  
WALTER J. HANAU, Chemical Engineer



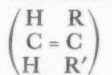
VINYL-TYPE resins are among the most recent materials made available to the surface coatings formulator. While some of the basic observations pertaining to these polymers date back to the latter part of the Nineteenth Century, most of the important vinyl resins have become commercially available within little more than a decade. Extensive coating uses, as well as many special resins, have been developed only during the last few years. The object of this article will be to survey the existing technical literature on these resins, with special emphasis on the properties of each resin, and the formulation and performance of vinyl polymer based coatings.

It is realized that the subject of vinyl-type polymers is far too extensive to permit complete coverage of the available literature. Therefore, certain compromises had to be decided upon, regarding the extent of coverage and the completeness of the literature survey. Generally speaking, we have tried to abstract only as much of the available literature as needed to give a fairly complete picture, and to attempt to cover nearly all important phases of the subject.

**Uses:** Mainly, emphasis has been centered on protective and decorative coatings; also such applications as cloth and paper coatings. Adhesive coatings are noted in passing. Non-coating applications such as molding compounds, free films etc., while in many cases involving the materials under discussion for coatings, are considered to be outside the scope of

this discussion and therefore not mentioned.

**Products:** We prefer not to draw arbitrary limits with regard to polymers included in this paper; any polymer formed by addition polymerization of mono-olefin molecules



is to be considered a vinyl-type material. This is to avoid excluding important related materials which are not strictly vinyl polymers, e.g. vinylidene chloride, methacrylate polymers, etc. Diene polymerization is considered outside the scope of this treatment, except for a short section on copolymerization of mono-olefins with di-olefins. Subjects such as drying oils, styrenated alkyds, and other instances where vinyl polymerization plays only an incidental part, have been omitted from this discussion.

**Sources Used:** Text books have been used mainly for theoretical background and other general information not excessively susceptible to becoming obsolete; technical articles both for late theoretical develop-

ments and practical information. Patents have been used very little, and only where the application described is of special interest from a theoretical point of view; the reason for this limited use is the fact that the mere existence of a patent does not indicate that a process or product has any reasonable chance of attaining commercial importance. Manufacturers' literature has been widely used as the best first-hand reference on materials actually produced commercially, even though it is realized that a manufacturer's evaluation of his own product may occasionally be on the optimistic side.

### Factors Affecting Properties

WHILE the resins within the scope of this paper will be discussed individually regarding their properties, a brief general consideration of the factors affecting polymer behavior may be useful in coordinating the information to be presented.

The forces holding one polymer molecule to another are increased by increasing amount and strength of polar groups (e.g. OH, highly polar; Cl and ester groups, moderately polar; hydrocarbon groups, weakly polar or non-polar); and by increasingly close packing of molecules, allowing these forces to come into play; this latter, in turn, is favored by a "streamlined" molecular shape showing no bulky side chains, and by regular recurrence of polar groups. An increase in any of the above factors, generally speaking, will increase the cohesion of the

This is the first of a series of several articles on the use of vinyls in surface coating technology. Part I covers theoretical aspects emphasizing the polymer structure and its effect on the properties of the particular resin in question. Part II, scheduled for our next issue, will cover detailed information on the characteristics and properties of the various type of vinyl resins, their uses and methods of formulating them in coating materials.

polymer, enhancing its toughness when used in coatings. In addition, an increase in molecular length, without other change of molecular structure, increases toughness by distributing applied stresses over a wide area. Melting point is increased, and solubility and speed of solution are decreased, by an increase of the above factors which enhance intermolecular cohesion. Solution viscosity is roughly proportional to the viscosity of the pure solvent, to the molecular weight of the polymer, and to the logarithm of its concentration (weight per unit volume). It is also affected by the nature of dispersion. Aside from the above considerations, a polymer dissolves most easily in a solvent of similar polarity.

The above statements, while admittedly are greatly over-simplified, should be of use in estimating the behavior of a polymer of known chemical makeup and of unknown properties, or conversely in determining the most promising polymer for applications requiring specific properties. As examples of the practical effects of the general principles mentioned above, the following should be representative: Polyvinyl alcohol, a compound of high polarity and of high symmetry, shows great toughness, a very high softening point, and is soluble in water (highly polar liquid). Various types of hydrocarbon and other low-polarity polymers (e.g. polyisobutene, polystyrene, coumarone-indene) tend to be soft, show low melting points, and are easily soluble in non-polar solvents; this applies even to reasonably "streamlined" molecules. However, polyethylene, having the highest possible degree of "streamlining" shows amazing toughness, a rather high melting point and total insolubility at ordinary temperatures. Polyvinyl chloride (intermediate polarity) is quite tough, especially the longer-chain. It dissolves with difficulty in solvents of moderate polarity (e.g. ketones). Incorporating other monomeric materials in the polymer decreases the symmetry of the molecule, and thus facilitates solution, lowers the softening point, and renders the polymer more pliable (internal plasticizing effect). The last two effects are also accomplished by the solvent action of certain high-boiling liquids, which decreases the intermolecular attractive forces by entering between

polymer molecules. This subject will be taken up in detail in later part of this series. The polymers to be described consist mainly of straight chains with each monomer molecule oriented in the same direction within the polymer chain. Due to the reactions by which polymerization proceeds, small percentages polymerize counter to general orientation. Some branched-chain formation also occurs. These act as internal plasticizers. However, any cross-linkage connecting main chains tends to render the resin insoluble and infusible. Cross-linkage is not usually associated with vinyl polymers. Coatings are sometimes formulated to become insoluble on baking, by cross-linking reactive pigments with resin additives.

Briefly then to determine a formulation likely to fit a particular use, we may say that for maximum toughness and resistance to a wide range of solvents, a "streamlined" polymer molecule of high molecular weight is desired; the opposite would be advisable for ease of solution and maximum solids content. Generally, the molecule should be free of polar structures especially hydroxy groups for maximum water resistance. If oil resistance is desired, polar groups should be present. Choice of solvents, on the same principle, indicates the use of a liquid of similar polarity as the resin is being dissolved.

While many valuable coating modifications may be obtained by blending several resins, extreme caution is necessary to assure compatibility of the combinations chosen, both in solution and in dry film. As far as available, compatibility data on individual resins will be presented subsequently in the sections dealing with them; no satisfactory overall rule appears to exist. Incompatibility often exists even when the solvent system is satisfactory for either component, and may show itself in immediate gelling, or in cloudiness followed by phase separation, or in lack of clarity and continuity of the film. Tests using the unpigmented combination are advisable to avoid the formulation of a pigmented coating which, though free of noticeable gelling, may be deficient in film strength, gloss or pigment tinctorial strength. These deficiencies are due to incompatibility of components of the vehicle. Reactivity between pig-

ments and polymers, of course, is another factor to be guarded against in this connection.

### Preparation of Polymers

THE preparation of polymers will be taken up only briefly, because the formulator of finishes will almost invariably use commercially produced polymers. The equipment and process controls required are such that large producers are at an advantage in making materials of high quality economically.

The only things to be mentioned in a paper of this scope regarding theoretical polymerization are that there are two ways for the reaction to proceed, one catalyzed by acids or salts (e.g. HCl, AlCl<sub>3</sub>, BF<sub>3</sub>) and activated by ultraviolet radiation, the other catalyzed by peroxides and similar compounds (possibly formed from traces of oxygen present) and activated by increase in temperature. Due to the nature of the reaction, polymer molecules grow to final size in a very short time (in the order of 1/1000 second). The reaction, which for this class of materials is  $n(\text{H}_2\text{C}=\text{CHX}) \rightarrow (\text{CH}_2-\text{CHX})_n$  (X being any monovalent element or radical), is also activated by the difference between atoms at the two sides of the double bond, explaining the tendency toward straight-chain, "head-to-tail" polymerization mentioned above.

In order to assure uniform quality of polymers produced, reaction conditions and monomer purity must be precisely controlled. Inhibitors (antioxidants) are used to prevent polymerization of monomer in storage, and to stop the reaction when  $\frac{3}{4}$  completed. The reason for the latter step is that undesirable side reactions, such as branched-chain formation, occur more frequently as the amount of available monomer decreases. When the reaction is completed the unreacted monomer is recovered by distillation. Increase in catalyst concentration or in reaction temperature increases the rate of polymerization and decreases the average molecular weight of the product. Dilution of the monomer with a solvent decreases both the reaction rate and average molecular weight. The extent of each of these effects varies widely with the type of solvent employed. Storage of monomers should be in cool, dark containers

away from air to prevent premature polymerization.

In industrial practice, most vinyl-type polymerizations are carried out between 30 and 150°C, depending on the monomer, reaction medium, and product desired. With metal halide catalysts, temperatures as low as -100°C may give very rapid polymerization e.g. production of polyisobutylene. Production of polyisobutylene requires high temperature and pressure due to the absence of the activating "unbalance" at the double bond mentioned above. Generally speaking, polymerizations involving gaseous monomers are carried out at sufficient pressure to keep the monomer in the liquid state. However, gas-phase polymerization is used in the production of polytetrafluoroethylene. The following major types of polymerization are used:

A. Bulk or mass polymerization, in which the monomer is reacted in absence of any solvent or diluent. The advantages of this method are potentially rapid production and freedom from retained solvent or diluent. However, control of the reaction may be difficult due to the large amount of heat evolved. Overheating will result in poor color and non-uniform molecular weight. As the reaction proceeds and the viscosity rises, the dissipation of the heat becomes difficult.

B. Solution polymerization, in which the monomer is dissolved in or diluted with a miscible liquid during polymerization. The polymer may be soluble in the solvent, or it may precipitate as the polymerization proceeds. Cooling is facilitated by this method, often carried out at reflux temperature; however, the reaction is slower than the mass method and the retained solvent is almost impossible to remove completely.

C. Emulsion polymerization, in which the monomer is emulsified in a non-solvent, usually water, with the aid of emulsifying agents (e.g. soap) and sometimes protective colloids (e.g. casein, gums). Temperature is easily controlled, and reaction rates and molecular weights of the product are high.

In cases where the product can be used as a latex or emulsion (e.g. coatings, adhesives, textile finishing), the use of an emulsion as produced offers obvious economic advantages. However, if bulk resin is to be recovered, the emulsion must be broken by use of electrolytes or solvents, and the resin washed and dried. Elimination of electrolytes and emulsifying agents, which are detrimental to water resistance and other properties if retained, may present serious problems.

D. Suspension or pearl polymerization retains the major advantages of suspension polymerization while eliminating the problem of recovering bulk resin. Relatively large drops (0.02 to 0.2 inch in diameter) are kept suspended by mechanical agitation in water containing a stabilizer e.g. talc, gelatin, polyvinyl alcohol) but no emulsifying agents. The polymer is recovered in the form of hard pearls, which are easily washed.

#### Copolymers

ESSENTIALLY, the beneficial effects of copolymerization, and reacting several different monomers to form a mixed polymer molecule, can be classified as (a) increased solubility and flexibility due to lowered symmetry (previously mentioned); (b) blending of the desirable properties of several polymers, which in many cases cannot simply be mixed because of incompatibility of the pure polymers; (c) introducing a reactive group into a polymer; such as the introduction of butadiene into polyisobutylene to render it vulcanizable, or the introduction of maleic acid into vinyl copolymer to secure adhesion to bare metals. The latter is called hetero-polymerization, whereby an olefin not polymerizable by itself (maleic acid) may be polymerized with other, inherently polymerizable olefins.

The methods of producing copolymers is essentially the same as described above for pure polymers, except that monomers of widely different polymerization rates cannot be copolymerized since the more active component would polymerize first. By the same token, some monomer combinations, depending on the starting ratio used, show widely dif-

fering composition of the polymer formed at the start and finish of the reaction, as one component is used up more quickly than the other. Since reasonable uniformity is required this limits the monomer ratios commercially available.

#### Chemical Modification

CHEMICAL modification of vinyl polymers after polymerization is rarely practiced because of the greater ease of achieving the desired composition by proper choice of monomers. At present, the main exceptions are polyvinyl alcohol, made by hydrolysis of polyvinyl acetate, and acetals made from polyvinyl alcohol. This procedure is necessary because the monomer, vinyl alcohol, does not exist in a stable form.

Due to the extra operations involved, and the more complex nature of these operations, chemically modified polymers always are considerably higher in price than similar materials obtained by straight polymerization or copolymerization. Thus, partially or fully hydrolyzed polyvinyl alcohols are about twice the unit price of polyvinyl acetate.

#### Upressit Products Appoints Kansas City Distributor

Morton-Meyers Company, 3201 Southwest Boulevard at State Line, Kansas City, Missouri, has been appointed distributor for the Upressit Products Corporation of New York, covering the Kansas City area. Upressit Products Corporation is manufacturer of Upressit caps and tamper-proof seals for the sealing of cans, bottles, and other containers.

#### Eakins Color Appoints Los Angeles Representative

J. S. & W. R. Eakins, Inc., Brooklyn, New York, manufacturer of dry colors, announced that A. J. Lynch & Co., has been appointed as representatives in Los Angeles, California. Martin, Hoyt & Milne will continue to act in a similar capacity in Portland, Oregon and Seattle, Wash.

#### New Office for Wyandotte

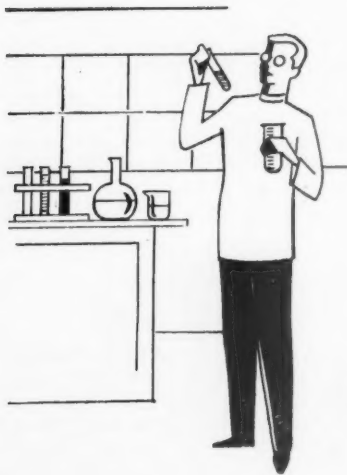
Wyandotte Chemicals Corporation, Michigan Alkali Division, has moved its Cincinnati office to 825 Dixie Terminal Building, Cincinnati 2, Ohio. The telephone number is Cherry 4941.



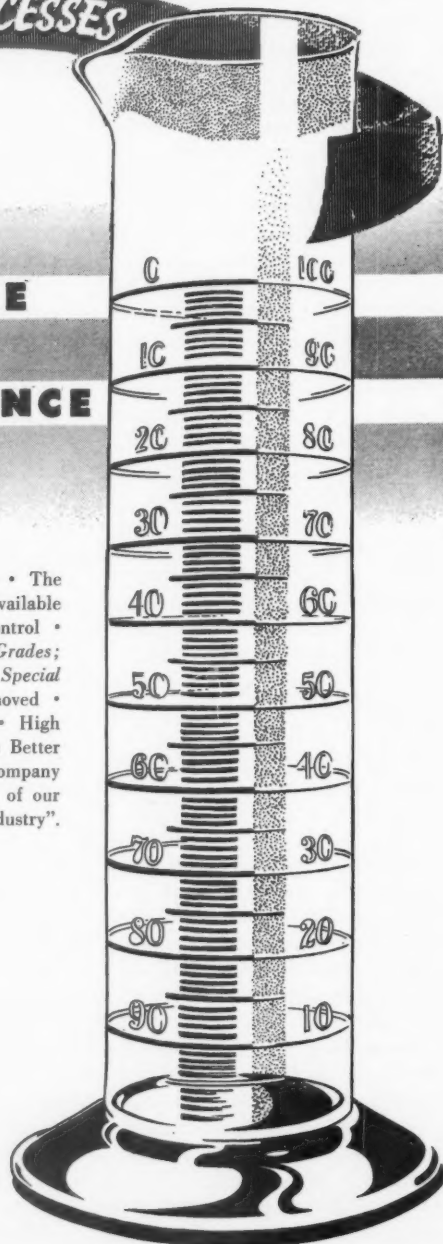
# ANOTHER GROSS FATTY ACID FOR BETTER PRODUCTS and PROCESSES

## A FULL MEASURE OF PERFORMANCE

Years of Fatty Acid Specialization • The Most Modern Distillation Apparatus Available • Constant Research • Constant Control • Uniform Lauric Content • *Two Grades; Regular* No Fractions Removed and *Special* Capric and Caprylic Fractions Removed • Color As Light as I Gardner 1933 • High Quality Purity and Uniformity • The Better Coconut Fatty Acid by A. Gross & Company • Write for your samples and a copy of our new booklet "Fatty Acids in Modern Industry".



*The Coconut  
Fatty Acid of  
Superior Quality*



**A. GROSS & Company**

295 MADISON AVENUE • NEW YORK 17, N. Y.  
Factory: Newark, N. J.

MANUFACTURERS SINCE 1837



# Hot Lacquers

THE current and rapidly growing interest in the hot-lacquer process has introduced many questions about the formulation, application, properties, and economy of hot lacquers. Many of these questions are tabulated here, along with answers which have been developed as a result of actual experience with the process.

## General

1. What is the hot-lacquer process?

The hot-lacquer process is a relatively new technique wherein heat is used instead of volatile lacquer thinner to reduce viscosity.

2. Are cost savings possible with hot-lacquer when the price of a gallon of hot lacquer is higher than that of a gallon of room-temperature lacquer?

The price of a gallon of hot lacquer is often higher than that of room-temperature lacquer because some of the thinners are omitted and a larger proportion of lacquer solids which are higher priced ingredients is present. In spite of the slightly greater cost per gallon of hot lacquer, it is very economical to use. The savings in materials and in the cost of application which can be obtained more than offset the small price premium. In furniture, the average hot lacquer is about 20 to 25 per cent higher in cost per gallon, but 40 to 55 per cent greater coverage can be obtained.

## Cost

1. Is it more economical to apply lacquers at elevated temperatures than at room temperature?

Yes, hot lacquer can be applied at higher solids than room-temperature lacquers. High-solids lacquers are economical because they make possible savings in material and in

These questions and answers about the hot lacquer process were prepared by the Hercules Powder Co., Wilmington, Del.

the cost of application of an adequate film.

2. How can material be saved?

Material savings can be made in two ways. When a typical 30 per cent solids hot lacquer is used, 2.33 pounds of volatile solvent are required to apply 1 pound of lacquer solids. When the same lacquer is applied at 21 per cent solids at room temperature, 3.76 pounds of solvent are required to apply 1 pound of lacquer solids.

Material can also be saved by using lower air pressure to atomize lacquer when spraying. This can be accomplished by spraying at lower-than-normal viscosities. To make this feasible, advantage must be taken of the viscosity drop which results from heating lacquer. The less air used in spraying the less overspray is produced, and reduced overspray means lower material losses.

3. How can the cost of applying lacquer be reduced by using hot lacquer?

When hot lacquer permits the application of a given film thickness in fewer coats, a large reduction in the application cost results. Thus, the reduction of a three-coat application to two coats results in a 33 per cent saving in application cost. Likewise, the reduction of a two-coat application to one coat results in a 50 per cent saving in application cost.

4. Can the cost of applying lacquer be reduced in ways other than the above when hot lacquer is used?

Yes, lacquers applied at room temperature are nearly always sanded, rubbed, and polished. Because hot lacquers flow out better than room-temperature lacquers, less time is needed to perform this operation. Users of hot lacquer report 40 to 60 per cent reduction in sanding, rubbing, and polishing costs.

5. Is coverage greater with hot lacquers than with room-temperature lacquer?

Yes, hot lacquer means higher solids, and higher solids mean greater coverage per gallon. A large furniture company recently reported that they are obtaining a coverage of 408 square feet per gallon of hot lacquer; whereas, they formerly averaged only 335 square feet with a gallon of varnish.

## Properties

1. Do hot lacquers have poorer cold-check resistance than room-temperature lacquers?

A hot lacquer applied at a given film thickness will have the same degree of cold-check resistance as a cold-lacquer film of equivalent thickness, provided both lacquers are formulated to the same quality standards.

2. Do hot lacquers print more readily than room-temperature lacquers?

No, poor print resistance is a function of the inherent film hardness and of the amount of retained solvent rather than the temperature of application.

3. Do hot lacquers show more shrinkage than room-temperature lacquers on aging?

This question is difficult to answer because no concrete definition of the term shrinkage exists. Our experience has been that lacquers sprayed both at room temperatures and at 160°F. (with solvent adjustment only) do not show different degrees of shrinkage at equivalent film thicknesses.

4. Do hot lacquers rub and polish as readily as room-temperature lacquers?

Rubbing and polishing characteristics of a lacquer are not functions of the temperature at which lacquer is applied. They depend more on the ability of the film to release solvent and on the inherent hardness of the film.

5. Are hot lacquers degraded by long-time exposure to temperatures as high as 160°F.?

Lacquers have been held at 160°F. for 8 hours without any decrease in viscosity and for 72 hours without deleterious effects on film properties. Lacquers held at elevated temperatures for more than 8 hours may show a 5 to 20 per cent viscosity drop. A viscosity drop of this nature is not considered serious under such drastic treatment.

6. How do the sanding qualities of hot lacquers compare with those of room-temperature lacquers?

The sanding quality of a lacquer does not depend on the temperature of the application. However, because hot spraying enables deposition of films with less orange peel, less sanding is frequently required.

7. Do hot lacquers have less tendency to sag than room-temperature lacquers?

An actual test showed that three times as much hot lacquer could be applied before sagging occurred.

8. Is it true that hot lacquers do not blush when applied in humid conditions?

Blushing of hot lacquers rarely occurs. Lacquers sprayed at 160°F. have not been found to cool below room temperature during drying, thus preventing condensation. Furthermore, those solvents which have the greatest temperature-depressing effect when they evaporate are generally not used in hot lacquers; when used, they are present in very small quantities.

9. Do hot lacquers have exceptionally good flow-out?

A 3-mil film of hot lacquer applied in one coat seems to flow out smoother than a 3-mil film of room-temperature lacquer built up from three 1-mil coats.

10. What effect do hot lacquers have on adhesion?

There is no evidence that the adhesive properties of a lacquer are affected by the temperature of application.

11. Does the hot-lacquer process make possible the formulation of lacquers of improved quality?

When heating a lacquer results in decreasing the viscosity of the lacquer below that of the normal spraying range, nitrocellulose of a higher viscosity type or a larger proportion of nitrocellulose can be used in formulation. Either of the above procedures produces lacquers with improved cold-check resistance, toughness, flexibility, and print resistance.

#### Application

1. How are hot lacquers generally applied?

Hot lacquers can be applied by the same techniques used to apply room-temperature lacquers. These include spraying, dipping, knife-coating, and other methods.

2. Can pigmented lacquers be applied hot?

Yes, pigmented hot lacquers are no more difficult to apply than room-temperature lacquers.

3. What is the best temperature for applying hot lacquers?

Generally, 160°F. is recommended. Lacquers can be held at this temperature for 8 to 12 hours with no noticeable effect and for several days without marked degradation of properties. Furthermore, the decrease in viscosity obtained as lacquer temperature is increased above 160°F. is relatively small.

4. At what temperature is hot lacquer being sprayed when it hits the surface?

Lacquer applied at 160°F. has been found to be at room temperature when sprayed on an object 8 inches from the spray gun. This is in contrast to regular lacquers which are approximately 20°F. below room temperature, 8 inches from the spray gun.

5. Is it an advantage to use hot air to atomize hot lacquer?

Laboratory tests have shown that hot air is not beneficial in applying hot lacquer. In some tests the use of hot air has produced poorer films than were obtained with the same lacquer using air at room temperature.

6. Can thicker films be applied from hot lacquer than from room-temperature lacquer?

Yes, there is a natural tendency for the spray operator to apply a heavy film when using hot lacquer.

7. Is pinholing more troublesome with hot lacquers than with room-temperature lacquers?

Pinholes in lacquer films applied hot or cold appear when the top of a bubble of air trapped in a lacquer film breaks. Lacquer solvents must be blended in such a manner that air trapped between particles of atomized lacquer when it strikes the surface to be coated can rise to the surface and be released before the surface of the film dries to a typical film.

It has been reported that difficulty with pinholing is encountered occasionally when hot lacquer is applied to certain open-grain woods. In certain instances, this trouble has been traced to the filler employed. If pinholing develops when trials are made with hot lacquer, the filler

should be examined as a source of trouble.

8. Is it beneficial to heat the object being sprayed when using hot lacquer?

Laboratory work has shown that best results with hot lacquer are obtained when the object being sprayed is at room temperature or slightly higher. Extreme cooling or heating is not desirable.

9. Is the spraying technique the same for hot lacquer as for room-temperature lacquer?

It is essentially the same. Because of the higher solids content of hot lacquer, build-up is somewhat more rapid and fewer gun strokes are required. In general, hot lacquer makes it possible to obtain the spraying qualities of higher solids competitive finishes such as varnish or synthetic enamel, while still retaining the advantages that can be obtained with lacquer.

#### Formulation

1. How do hot lacquers differ from lacquers made for room-temperature application?

The nonvolatile portion of a lacquer, the part which forms the film, need be no different in a hot lacquer than in a room-temperature lacquer.

The solvent ingredients, however, must be changed. To spray at 160°F., it is advisable to eliminate fast-evaporating solvents such as acetone, ethyl acetate, methyl alcohol, etc., from the blend.

2. Are hot lacquers formulated at higher solids than room-temperature lacquers?

Yes, lacquers prepared for hot application generally contain 40 to 55 per cent more solids than room-temperature lacquers.

3. Can all pigments and dyes used in room-temperature lacquers also be used in hot lacquers?

Generally, yes. Some care must be taken in selecting pigments to eliminate highly reactive types. The catalytic effect of heat encourages acidic or alkaline pigments to react. Dyes which are not heat stable should be avoided.

4. Can certain resins or plasticizers be selected which will produce exceptionally low viscosities in hot lacquers.

The viscosity drop which occurs when lacquer is heated has been

(Turn to page 25)

**WHERE** you get it...  
**DOES** make a difference



When you place your order with Barrett you're assured prompt, dependable service and top-quality products, backed by 96 years of successful manufacturing experience.

### WHEN YOU NEED A COAL-TAR SOLVENT

Benzol  
Toluol  
Xylol  
Hi-Flash Solvent

GET IT  
FROM



Reg. U. S. Pat. Off.

Phone your orders for express tank-truck deliveries

Boston .....	Malden 2-7460	Indianapolis .....	Garfield 2076
Buffalo .....	Delaware 3600	Los Angeles .....	Mutual 7948
Chicago .....	Bishop 7-4300	Newark .....	Mitchell 2-0960
Cleveland .....	Cherry 5943	New York .....	Whitehall 4-0800
Detroit .....	Vinewood 2-2500	Philadelphia .....	Jefferson 3-3000
		St. Louis .....	Lockhart 6510

Hi-Flash Solvent available at all stations, except Buffalo.

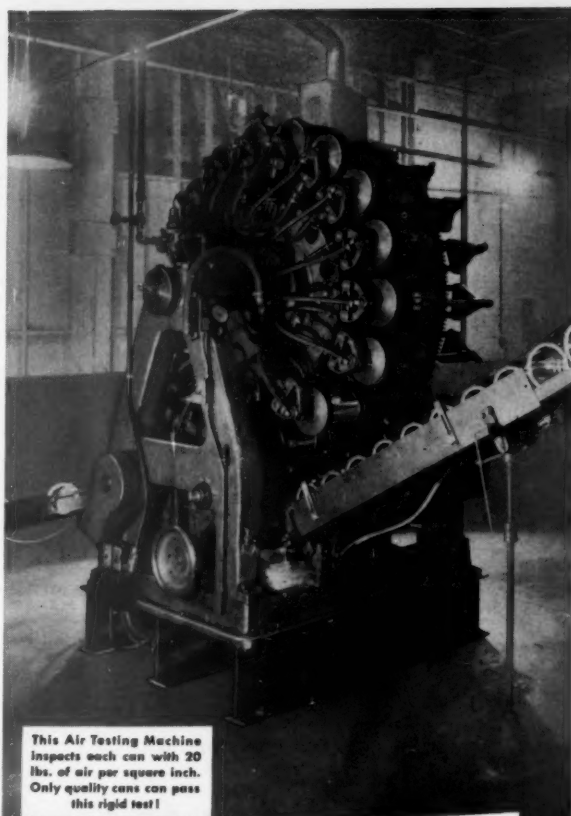
### THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N.Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

PAINT AND VARNISH PRODUCTION, FEBRUARY 1951



This Air Testing Machine inspects each can with 20 lbs. of air per square inch. Only quality cans can pass this rigid test!

## DAVIES CANS

are quality tested  
for product protection

Every Davies can is individually inspected with the best testing equipment. Paint manufacturers using Davies cans are assured of the *ultimate* in product protection... As specialists in paint containers, the entire facilities of Davies Can are at the *exclusive* service of the paint industry... For the finest in cans and the best of service, get in touch with Davies!

### THE DAVIES CAN COMPANY

8007 GRAND AVE. • CLEVELAND 4, OHIO



FOR EVERY TYPE OF  
 ✓ LACQUER  
 ✓ VARNISH  
 ✓ ENAMEL  
 ✓ PAINT

**UNITED  
 BLACKS**

*Use* KOSMOLAK KOSMOS F4  
 DIXIE PERFECTO  
 KOSMOS BB DIXIE 5

**UNITED CARBON COMPANY, INC.**  
 CHARLESTON 27, W. VA.  
 NEW YORK AKRON CHICAGO BOSTON  
 CANADA: CANADIAN INDUSTRIES, LIMITED

**HELLIGE  
 VARNISH  
 COMPARATOR**

EMPLOYING **NON-FADING**  
 GLASS COLOR STANDARDS

Modern Apparatus for Precision  
 and Accuracy in Color Determinations of Varnish, Oils, Resins, Nitro-Cellulose Lacquers, and Similar Transparent, Colored Liquids.

Write for  
 Catalog No. 605-40V

**HELLIGE**  
 INCORPORATED  
 3718 NORTHERN BLVD., LONG ISLAND CITY 1, N.Y.  
 HEADQUARTERS FOR COLORIMETRIC APPARATUS

**PHOTOVOLT**  
 Photoelectric GLOSSMETER



For reliable gloss measurements according to ASTM D523-49T on paints, varnishes, and lacquers

Also for

- Tristimulus Colorimetry with 3 Filters
- Sheen Measurements at 85 Degree Incidence
- Dry Hiding Power and Infra-Red Reflectance

in accordance with Federal Specifications TT-P-141b

**Portable, rugged, simple to operate**

Write for Bulletin #677 to  
**PHOTOVOLT CORP.**  
 95 Madison Ave. New York 16, N. Y.

on the fighting fronts....

**FALKYD RESINS** insure  
 perfect performance  
 in your products!

Backed with an outstanding World War II service record, Falkyd Resins step to the front in the mobilization program. As key raw materials, they play a vital part in the manufacture of a wide variety of finishes and protective coatings including those for tanks, ships, ammunition, aircraft and jeeps.

If you have an Army or Navy Specification to meet... the facilities of our laboratory and staff are at your disposal... to help find the right Falkyd Resin to meet your specification requirement.

**WRITE... WIRE  
 or PHONE TODAY!**



**FALK & COMPANY**  
 PITTSBURGH 30, PA.  
 PLANTS: EDGEWATER, N. J. • PHILADELPHIA, PA. • CARNegie PA. • MINNEAPOLIS, MINN.



## INSTRUMENTATION

(From page 14)

6 psi. At this point the electrical contact in pressure switch P2 opens, extinguishing the single gas burner, and, at the same time the cold water valve opens, proportionately controlling the flow of water through the cooling coils.

Combined with the use of direct firing, this method of control continuously maintains the temperature within plus or minus one degree without any serious over or under-shooting.

### Pressure and Vacuum Control

IN MOST instances, the reaction is carried out under atmospheric pressure conditions, in an inert atmosphere. On some occasions, depending upon the nature of the batch, a vacuum or pressure is applied to the vessel.

Pressure or vacuum control is obtained from a recording pressure gauge (range 30 inches of mercury vacuum to 15 psi gauge) with wide band proportional control. The controller positions a high lift diaphragm motor control valve on a by-pass line to a venturi type air ejector. Pressures above atmospheric are obtained by throttling of the ejector exhaust against the pressure generated by the batch and the inert gases introduced into the kettle.

Volatile materials are condensed by means of a special trap, thus preventing them from being carried over into the air ejector system.

### Central Control Room

A REMOTELY located panel-board provides a centralized point for close supervision of the varnish kettles which may be in operation throughout the plant.

A multi-point strip chart recorder may be employed to provide a record of the temperatures in each kettle or a pneumatic indicator may be connected through a multi-point key switch cabinet to various thermocouples. For example, each kettle might have a second thermocouple connected to the switch cabinet. In addition, thinning and mixing tanks, as well as vessels in the tank farm used occasionally for blending might have thermocouples connected to the

indicator or the recorder, as desired.

The panel may also include one or more three-pen pressure gauges, with each pen recording the pressure of each resin kettle. Finally, an electronic flowmeter can be utilized to record and integrate the steam flow consumed in the entire plant.

### Finished Product Control

IN THE varnish industry, it is well known that the extent to which the varnish cook has progressed may be determined by the viscosity of the material. With conventional viscosimeters, however, a sample must be removed from the batch and cooled to a standard temperature before a determination can be made. It is possible to prepare temperature-viscosity relation curves for each type of formulation, eliminating the need of cooling the sample to a standard temperature. However, what is gained on the one hand is lost by the other, since the process of preparing temperature-viscosity curves for each formulation is exceedingly time consuming.

The problem resolves into a need for a method of determining the viscosity of the batch itself, rather than of a withdrawn sample. The sensing element for this hypothetical instrument delivers an emf whose magnitude is a direct function of the viscosity of the varnish. This emf is then fed into a recording instrument, and the operator easily knows when the end point has been reached by simply glancing at chart record (graduated directly in poise or centipoise).

It seems certain that the answer to this problem of continuous viscosity determinations must inevitably be found by the irresistible, knowledge-thirsty mind of today's scientist.

## HOT LACQUERS

(From page 22)

found to be primarily a temperature phenomenon rather than the result of the improved solvency of a resin or plasticizer for nitrocellulose at the higher temperature.

5. Can lacquers based on film-forming ingredients other than nitrocellulose be sprayed hot?

Many of the advantages which result from spraying nitrocellulose lacquers at elevated temperatures also

appear when applying hot lacquers based on ethyl cellulose, cellulose acetate, high-viscosity vinyl resins, and Parlon (chlorinated rubber).

6. Can wood lacquer sealers be applied hot?

Yes. However, care must be taken not to use a spraying temperature higher than the melting point of the sanding aid in the sealer formula. Zinc stearate, a common sanding aid, should not be used in lacquers which are to be sprayed above 140°F. When sealers are used for the sole purpose of sealing the under surface rather than to obtain build, a thin, continuous film is satisfactory and the heavier films obtained with hot lacquer are not necessarily desirable.

### Sherwin-Williams Completes Can Plant in Hubbard, Ohio

The Sherwin-Williams Co. has announced the completion of the half million dollar tin can plant at Hubbard, Ohio. J. J. Hudson has been named superintendent of this plant.

### Fischer Named Chief of Coatings Section of Nat'l Bureau of Stds.

Dr. Earl is the new Chief of the Organic Coatings Section of the National Bureau of Standards succeeding E. F. Hickson who retired last June after 31 years of service.

### Barrett to Increase Phthalic Anhydride Production

The Barrett Division, Allied Chemical & Dye Corporation, has announced a \$4,500,000 expansion project in Chicago, Illinois. The major purpose of this project is to increase substantially the Company's present capacity for the production of phthalic anhydride, now being manufactured at its Philadelphia, Pa., and Ironton, Ohio, plants. Also included in this project are added refining facilities and an entirely new power plant.

### Williams Named Manager of National Lead in Cleveland

Thomas B. Williams has been appointed trade sales manager of National Lead Company's Cleveland Branch, Pigment Division. Mr. Williams has been with the company for twenty-two years, starting as a salesman in the white lead-in-oil and allied products department in the Pittsburgh area. Last year he was named assistant trade sales manager of the Cleveland Branch.

## MILDEWING

(From page 11)

the use of fungicides in the undercoat is helpful, the important factor in the control of mildew is the amount of fungicide available in the finish coat. In fact, there are indications that the concentration of the fungicide at the surface of the top coat is the most critical factor. It has been observed frequently that a fungicidal paint will eventually mildew when exposed in the Tropical Chamber where there is no light or rain to dissipate the fungicide or erode the surface of the paint. Apparently the fungicide in the uppermost layer of the film is consumed and dust collects on the panel which permits mold growth to occur in due course of time. There actually may be lethal concentrations of the fungicide just below the surface of the film which are of no appreciable value, unless the surface of the film erodes or the fungicide migrates to the surface. Pursuing this line of reasoning, the development of a formulation from which the fungicide would slowly migrate to the surface may greatly increase the effective life of a fungicidal paint.

To summarize, paint is a food source for fungi and under appropriate conditions, particularly in the presence of moisture, mildewing of the paint will occur. The fungi which predominate on painted surfaces are species of the genus *Pullularia*, although others also appear. While fungi may grow through a paint film from the substrate, mildewing of the surface of the film by fungus spores from the atmosphere is of paramount importance. This implies that the mildew resistance of a fungicidal paint is largely a function of the concentration of the fungicide at the surface of the film. In evaluating the fungicidal properties of various compounds, copper 8-quinolinolate was found to be the most effective for controlling mildew. Certain phenyl mercurials, such as the salicylate, were next in order of effectiveness followed by the chlorinated phenols. Preliminary indications are that the biological activity of these compounds, when incorporated into paints which were weathered, is not seriously reduced by weathering. Control of mildew is improved by

proper formulation and the use of zinc oxide, but the use of appropriate fungicides is required. While new fungicides are being developed, significant advances can be made through the use of mixtures of existing fungicides and other formulating ingredients.

### BIBLIOGRAPHY

- (1) Cooke, T. F., and Vicklund, R. E., Ind. Eng. Chem., Anal. Ed., 18, 59 (1946)
- (2) d'Ana, Z., Angew. Chem., 41, 1143 (1928)
- (3) Eisenschiml, O., and Kalberg, V. N., Paint, Oil and Chem. Review, 111, No. 24, (1948)
- (4) Gardner, H. A., J. Franklin Inst. 179, 681 (1915)
- (5) Goll, M., and Coffey, G., Faint, Oil and Chem. Review, 111, No. 16 (1948)
- (6) Reynolds, E. S., Mycologia, XLII, No. 3, 432, (1950)
- (7) Vannoy, W. G., Official Digest, Fed. Paint, Varnish Production Clubs, Feb. (1948)
- (8) Vicklund, R. E., and Manowitz, M., Am. Paint J., Dec. (1947)
- (9) Vicklund, R. E., Manowitz, M., Bagdon, V. J., and Manderfield, F. M., presented before 118<sup>th</sup> National Meeting Am. Chem. Soc., Sept. (1950)

- (10) Westgate, M. W., Nat. Paint, Varnish and Lacquer Assoc., Sci. Cir. 719 (1947)
- (11) Weise, K., Farben-Ztg., 39, 412, 444 (1934)
- (12) New Jersey Zinc Co., Paint Progress, 8, No. 3 (1950)

### ASTM Committee Formed to Study Atmospheric Pollution

The Board of Directors for the American Society for Testing Materials has authorized the formation of a new technical Committee on Sampling and Analysis of Atmospheric Pollution. Dr. Louis C. McCabe, chief of Air and Stream Pollution, U. S. Bureau of Mines, an outstanding authority in this field, has accepted the temporary chairmanship of the new committee. In authorizing the committee, the Board stated that the Society will not consider the problems of specifying limitation of pollution, nor such other related matters as biological and health problems.

## What Can You See In Your Polyol Future?



If you are saddled with polyol (polyhydric alcohol) shortages, consider this:

Atlas is now *doubling* its sorbitol production. This important new polyol supply will be available late in 1951.

Here, at last, will be a *stable* source of polyols—derived from ample agricultural products—less subject to fluctuations in price and availability.

Plan *now* for sorbitol-based vehicles in your future. You may be amazed by the outstanding advantages sorbitol gives you in the synthesis of hard gums, "in situ" varnishes, tall oil esters, and alkyd resins. Sorbitol-based vehicles give you the range of control you want on melting points . . . viscosities . . . solubilities in your maleic and phenolic modified resin esters.

Write for the Atlas booklet giving practical formulas and specific directions for making sorbitol-based vehicles—it includes many suggestions for new products.

# ATLAS

INDUSTRIAL  
CHEMICALS  
DEPARTMENT



ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco  
ATLAS POWDER COMPANY, CANADA, LTD., Brantford, Canada

# PATENTS

Conducted by

Lancaster, Allwine &  
Rommel

PATENTS AND COPYRIGHTS

424 Bowen Building,  
Washington, D. C.

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired to Lancaster, Allwine & Rommel.

## Titanation of Polyvinyl Alcohol

U. S. Patent 2,518,193. Frank Kerr Signaigo, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

A method for titanating and insolubilizing polyvinyl alcohol film which, after treatment, is transparent to visible light and insoluble in boiling water which comprises swelling said film by contacting the same with an aqueous medium, and then subjecting the preswelled film to reaction with a solution of water-soluble, chlorine-free titanium compound having a  $TiO_2$  concentration and for such period of time that said alcohol becomes titanated to the extent of at least 1% by weight of titanium.

## Polymerization of Rosin

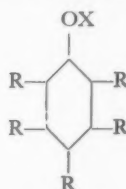
U. S. Patent 2,515,218. Burt L. Hampton, Jacksonville, Fla., assignor, by mesne assignments, to The Glidden Company, Cleveland, Ohio, a corporation of Ohio.

The method of polymerizing rosin which comprises the step of treating said rosin in liquid phase at temperatures between about 50° C. and 155° C. in the combined presence of about .2% to 5% of hydrohalic acid selected from the group consisting of hydrochloric acid and hydrobromic acid and an amount of between about .2% and 20% of an earth selected from the group consisting of fuller's earth, bentonite, rottenstone, montmorillonite, New Jersey clay, and bauxite, said treatment being carried out for at least one hour until substantial increase in the melting point of the rosin has been effected.

## Coating Composition

U. S. Patent 2,516,700. Donald F. Hollo-way and Harland H. Young, Chicago, Ill., assignors, by mesne assignments, to Swift & Company, a corporation of Illinois.

A coating composition substantially immune to bacterial decomposition and capable of substantially infinite dilution at a pH of 7 or lower without precipitation of water-insoluble protein, consisting essentially of the following ingredients in about the following parts by weight: a protein selected from the class consisting of casein and a water-insoluble vegetable protein, 15 to 35; urea, 15 to 35; water, 25 to 50; and 1 to 5 of a monoalkali metal salt of a phenylhydroxy derivative of the general formula



where R represents radicals selected from the group consisting of hydrogen, hydroxy, halogen, nitro, alkyl, aryl alkaryl, alkoxy, and aroxy, and X is an alkali metal.

## Styrene-Tall Oil Polyester

U. S. Patent 2,514,389. Sanford E. Glick, Springfield, Mass., assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware.

A polymerizable composition consisting essentially of 30 to 70 parts of styrene and 70 to 30 parts of a polyester which is a mixed ester taken from the group consisting of (1) the reaction product of a glycol having more than one but less than seven carbon atoms, tall oil, and a dicarboxylic acid having ethylenic unsaturation and not more than eight carbon atoms, said polyester having a tall oil residue content of 25% to 60% by weight and (2) the reaction product of a glycol having more than one but less than seven carbon atoms, tall oil, a dicarboxylic acid having ethylenic unsaturation and not more than eight carbon atoms and a vegetable oil substantially free from conjugated unsaturation, said reaction product (2) having a monocarboxylic acid residue content of 50% to 70%, and 50% to 75% of said monocarboxylic acid residue being derived from tall oil, the acid number of said polyesters being less than 50 and the glycol being used in said polyesters in an amount sufficient for the hydroxyl groups of the glycol to substantially balance the carboxyl groups in the acid components of the polyester.

## Drying-Oil Alkyds

U. S. Patent 2,530,315. John B. Rust and William B. Canfield, Montclair, N. J., assignors, by direct and mesne assignments, of one-half to Montclair Research Corporation, a corporation of New Jersey and one-half to Ellis-Foster Company, a corporation of New Jersey.

A soluble modified drying oil-alkyd resin, a drop of which may be drawn into strings, comprising the non-catalyzed product, at between 200° and 250° C., of a polymerizable polycarboxylic acid ester containing a plurality of carbon-carbon double bonds and comprising a beta-unsaturated monohydric alcohol ester of a polycarboxylic acid selected from the group consisting of diesters of allyl, methallyl, crotyl, and chloroallyl alcohols with phthalic, succinic, adipic, sebacic, maleic, fumaric, citraconic, itaconic, chloromaleic, 3:6-dihydrophthalic acids, butadiene-maleic adduct, cyclopentadiene fumaric adduct and isoprene-acetylene dicarboxylic acid adduct, diesters of allyl alcohol with cyclopentadiene-maleic adduct and isoprene-maleic adduct, and monomers of allyl, methallyl, crotyl, and chloroallyl alcohols with maleic, fumaric, citraconic, itaconic, chloromaleic, 3:6-dihydrophthalic acids, butadiene-maleic adduct, cyclopentadiene-fumaric adduct, and isoprene-acetylene dicarboxylic acid adduct, with a drying oil-alkyd resin formed by reacting the fatty acids of a drying oil selected from the group consisting of linseed, cottonseed, China-wood, oiticica, perilla, soya bean and sunflower seed oils, a polyhydric alcohol selected from the group consisting of glycerol, diethylene glycol, pentaerythritol, dipentaerythritol, sorbitol, mannitol, trihydroxymethylamino-methane, and trimethylolpropane, and a polycarboxylic acid selected from the group consisting of maleic anhydride, fumaric acid, phthalic acid, adipic acid, sebacic acid, and cyclopentadiene-maleic adduct, the unsaturated ester being 10% to 40% by weight of the composition, the said fatty acids being from 40% to 60% by weight of the composition.

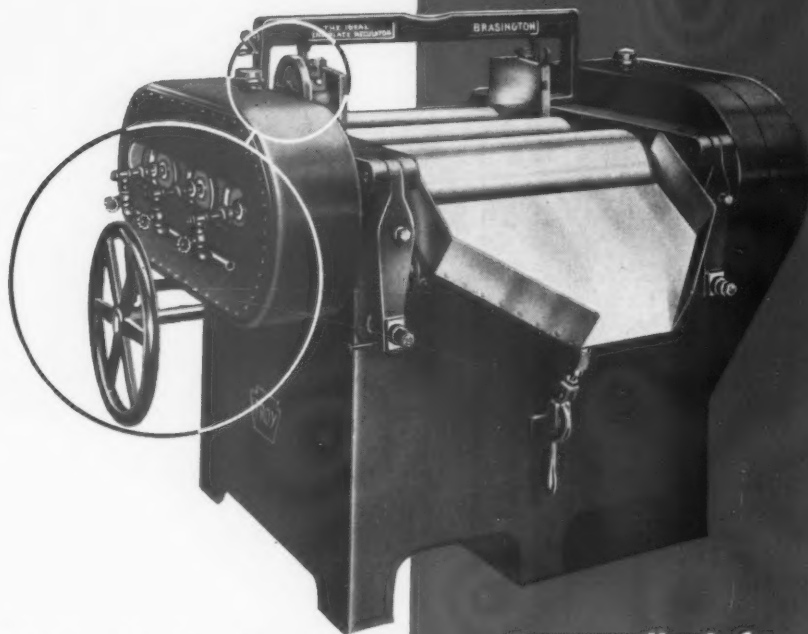
## LANCASTER, ALLWINE & ROMMEL REGISTERED PATENT ATTORNEYS

Suite 424, 815—15th St., N.W.  
Washington 5, D. C.

Patent Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.  
Booklet and form "Evidence of Conception" forwarded upon request.



# TROY 1 point adjustment ROLLER MILL



Here is the Troy 1 Point High Speed Mill that is just what you need for short run production. It's a 12" x 32" unit designed not only for fast production but for speeding up non-production steps: opening, cleaning, closing and resetting. If you are faced with frequent formula changes, clean-up time is important. If you have to make frequent repetitive settings, turning only *one* wheel and being guided by a dial setting will cut your setup time immeasurably.

Note the hand wheel and dial indicator. A spin of this wheel opens the mill for clean-up. To start another run, just turn the hand wheel back. Proper pressure is applied mechanically and positively at all four pressure points simultaneously. If a setting is being repeated, the dial indicates when to stop.

This 1 Point Adjustment 12" x 32" Mill is a high speed production unit. It is precision-made with heavy duty roller bearings, 'Ideal' apron adjuster and silent chain drive. We also manufacture this mill with the conventional 4 point adjustment.

**Unexcelled for**

- FREQUENT CLEANUPS
- REPETITIVE SETTINGS

Other manufactured products include: Troy 10" x 22", 6" x 14" and 4" x 8" Roller Mills; Troy Angular Mixer and Troy Triple Action Colloid Mill.



Process Machinery Division

**TROY ENGINE & MACHINE CO.**

Established 1870

TROY, PENNSYLVANIA, U.S.A.





# NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY



CHARLES ROSS

## PASTE MIXER

### Heavy-Duty

A new model direct motor driven heavy duty paste mixer of 50, 100 and 150-gallon capacity, #132, has been designed by Charles Ross & Son Company to reduce to a minimum the labor and mixing time elements in production costs.

Each unit has an individual right angle gearhead motor directly connected to the stirrer shaft, eliminating intermediate parts such as chains, gears and clutches. With a separate motor for each unit, the #132 Mixer offers a far more flexible unit.

As a safety feature, the mixers incorporate an automatic cut-off which stops the stirrers from revolving, without damage to the machine, should a bag or foreign matter fall into the mixer.

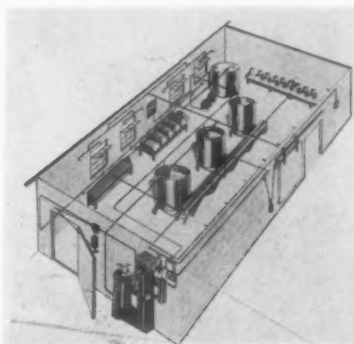
These new mixers are built of extra heavy construction to handle the heaviest consistencies or viscosities. At the same time, larger type outlet gates are furnished to facilitate the gravity feed and, opening and closing in a more direct manner, are more easily regulated by the mill hand below. Charles Ross & Son Co., 156 Classon Ave., Brooklyn 5, N. Y. PVP—February.

## DRY CHEMICAL SYSTEM

### For Fire Hazards

This dry chemical piped system is designed for automatic protection of industrial fire hazards.

This fire protection system, the first using dry chemical as extinguishing agent, is operated by an H.A.D. (heat-actuated device) mechanism. When fire starts and temperature increases, air expands within the H.A.D. This trips a nitrogen cylinder release pressurizing the dry chemical container. Dry chemical is then discharged through strategically located distribution heads onto the fire area.



Automatic controls can be added to the system to close doors, windows, ventilation ducts and to operate valves on pipes carrying flammable liquids. Electric controls can be included to shut off motors and fans, sound alarms and transmit signals to central stations or fire alarm headquarters. Ansul Chemical Co., Marinette, Wisconsin. PVP—February.

## LABELER

### For 5-Gallon Cans

Production of a new machine to eliminate costly hand labeling of five-gallon steel drums has been announced.

The new model Burt labeler will do both spot and wrap-around labeling, at a rate of about 18 five-gallon drums per minute. It a roll-

through type of labeler, handling the drums horizontally.

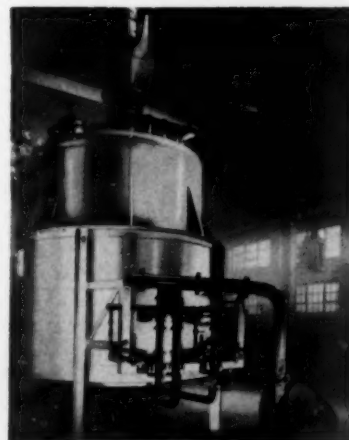
The new Burt spot and wrap-around labeler is entirely new to the packaging trade and provides great savings in both time and labor. Further details will be furnished by the Burt Machine Company, 401 E. Oliver Street, Baltimore 2, Maryland. PVP—February.

## RESIN UNIT

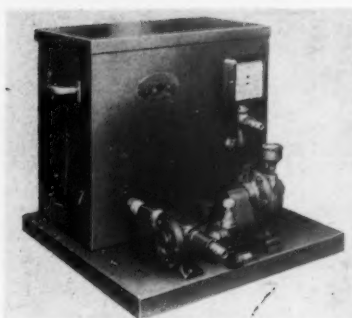
### Capacity of 3,000 Gallons

A recent installation of the Brighton Copper Works, Inc., Cincinnati, Ohio, is a tremendous synthetic resin unit. Its capacity is 3,000 gallons and is built of stainless steel. Special features include a radiant heat furnace, automatic newly designed and tested internal cooling element which replaces inefficient and hard to clean coils. This kettle is built for 15" of vacuum or 40 psi pressure in the kettle. These kettles are also made by Brighton to individual specifications in sizes from Laboratory to full Production units. For complete engineering data, costs and specifications write Brighton Copper Works, Inc., Brighton Station, Cincinnati 14, Ohio. PVP—February.

BRIGHTON



## NEW PRODUCTS



BEDE PRODUCTS

### PAINT HEATER

#### Supplies Large Volumes

The new Bede double unit paint heater is designed to supply a large volume of hot paint for installations using two or more spray guns. The new unit will supply 24 to 28 gallons per hour of hot paint, double the capacity of present heaters.

The heater consists essentially of two heating units mounted on a common base with a standard Bede circulating arrangement. The double unit heater heats paint to 160°-200° F. to reduce paint and solvent waste, increase the quality of the finish and reduce rejects. Constant circulation of the paint is provided to minimize temperature drop in paint lines to the spray guns.

Paint temperature and pressure are accurately controlled. The unit comes up to operating temperature within 15 minutes. Longer capacity models or models for installations where a number of colors are sprayed at the same spray booth can be built to specifications. Bede Products Inc., 4311 Ridge Rd., Cleveland 9, Ohio. PVP—February.

### FLOW TRANSMITTER

#### For Differential Pressures

V/A Cell is a new flow transmitter developed for differential pressure applications. Being basically a through-flow instrument of the variable area type, it measures by-passed portion of the main-line flow. It features high accuracy with a wide range, linear scale. This transmitter is applicable to services on liquids, gas, and vapor steam. Fisher & Porter Co., 42 County Line Rd., Hatboro, Pa. PVP—February.

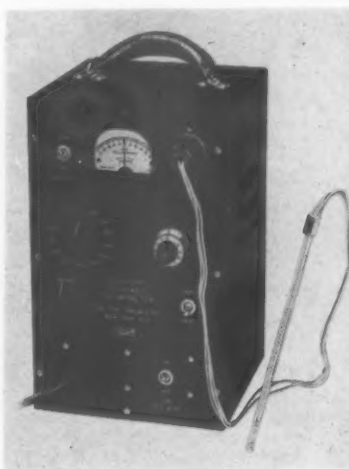
### THERMOMETER

#### Electron Type

Electronic resistance thermometer, complete with bridge and bulb, has recently been introduced.

In contrast to ordinary precision resistance thermometers, the new electronic instrument is foolproof and simple to operate—any laboratory technician can use it accurately. Simple to install, it plugs in like a radio and no permanent installation is necessary.

Having 13,000 divisions, the new Electronic Resistance Thermometer measures temperatures to 1000° C. with an accuracy of 0.1° C. and a sensitivity of .01° C. Because of the dead beat balance indicator and single range switch and slide-wire, rapid reading of the bridge is possible. Emil Greiner Co., 20-26 North Moore St., N. Y. PVP—February.



EMIL GREINER

### AGITATOR

#### For Heavy Pigmented Materials

Agitators in sizes to fit 30- and 55-gallon drums are suitable for mixing heavy pigmented materials which often settle during storage. It may be either hand or power operated. Chime scraper on blade bottom loosens settled material from chime of drum. Various planes of the agitator blade are turned at angles to facilitate raising settled materials from bottom of drum and mixing it thoroughly throughout contents. American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa. PVP—February.

### PALLET LOAD LIFT

#### Aluminum Alloy Type

Pallet load-lift designed and built on a new principle is being offered by the Market Forge Company of Everett, Mass. It is the only aluminum alloy pallet lift truck available and features special wheels that automatically retract when the forks are in a lowered position.

The truck, supported on two front wheels and two auxiliary wheels on a very short wheel base, turns around "on a dime." It cannot be cornered and will lift wherever a man can stand. Market Forge Co., 25 Garvey St., Everett, Mass. PVP—February.

### FORMALDEHYDE

#### Alcohol Solution

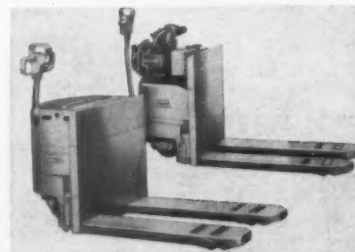
Solutions of formaldehyde in various types of alcohols are being made available to general industry for the first time and is known as Formcel. Tests have proven the practicability of handling a relatively water free alcohol solution of formaldehyde at regular temperatures in standard equipment. Cost savings and convenience of handling by regular methods make Formcel attractive to companies whose processes are based on a formaldehyde-alcohol end product. Celanese Corp. of America, 180 Madison Ave., New York 16, N. Y. PVP—February.

### HAND TRUCK

#### Power Types

Hand trucks in two power types but of one basic design are now available. One of the trucks is the Electro-lift, the other is Hydro-lift. Noteworthy features include: Compact design, Maneuverability, Power reserve, Ease of maintenance, Greater tractive ability, and Larger brakes. Clark Equipment Co., Battle Creek, Mich. PVP—February.

CLARK EQUIPMENT



## NEW PRODUCTS

### BAKED HAMMER FINISH

#### Good Uniformity

In response to widespread interest expressed recently in the baking types of hammer finishes of good uniformity on both horizontal and vertical surfaces, a new formulation worked out in its laboratories has been recommended to paint manufacturers. The formulation depends in principle upon the use of Uformite F-233 with Amberlac 80X.

The laboratory points out that anti-skinning and anti-silking agents must be added in this formulation to obtain a sharp, clear-cut hammer effect. GE 81069 silicone oil and 0.5 per cent National anti-skinning agent ASA to 10,000 parts of total resins solids were found to give satisfactory results.

#### Hammer Finish Formulation

Material	Pounds
Amberlac 80X (70% solids)	114.0
Uformite F-233 (50% solids)	40.0
Alcoa Superfine lead-free aluminum #1594	3.0
National anti-skinning agent ASA	0.5
GE silicone oil 81069 (1% solids in xylol)	1.0
Xylol	26.0
Butanol	10.0
Solvesso 150	2.0
Capryl alcohol	2.0

#### APPLICATION CONDITIONS

Viscosity—60 seconds, #4 Ford Cup  
 Spray Pressures—50 lbs. per sq. inc.; 15 lbs. per sq. in. on pressure feed cup  
 Spray Gun—DeVilbiss—Air Cap #30  
 Spray Technique—Hold gun about 12 inches from work. Apply light mist followed by light full coat.

Two-Tone Effects—Add extremely small amount of toner (less than 0.1% solid pigment) such as iron blue, chrome-yellow, or toluidine red when a 2-tone effect is desired.

Baking Schedule—Suggested schedule is 15 minutes air dry, followed by 15 minutes bake at 300° F.

Rohm & Haas Company, The Resinous Products Div., Washington Sq., Philadelphia, Pa. PVP—February.

### DISPENSER

#### Highly Efficient

A new type of dispenser is offered as an improvement over conventional colloid mill. The machine is said to have outstanding efficiency in such operations as dispersing pigments, in plasticizers and resins. Tri-Homo Corp., Salem, Mass. PVP—February.

### PUMP CONTROLLER

#### Provides Accurate Flow

Arising from a need by bulk station and loading rack operators in petroleum and chemical plants, a new pump sequence controller now starts and stops pumps automatically as the flow demand changes. The control is actuated by an explosion-proof electronic circuit which senses the flow demands by means of an accurate flowmeter located directly in the main pump header. Any number of pumps may be tied into the circuit. Flows of from ½ to 6000 gallons per minute may be handled. Fischer & Porter Co., Hatboro 4, Pa. PVP—February.

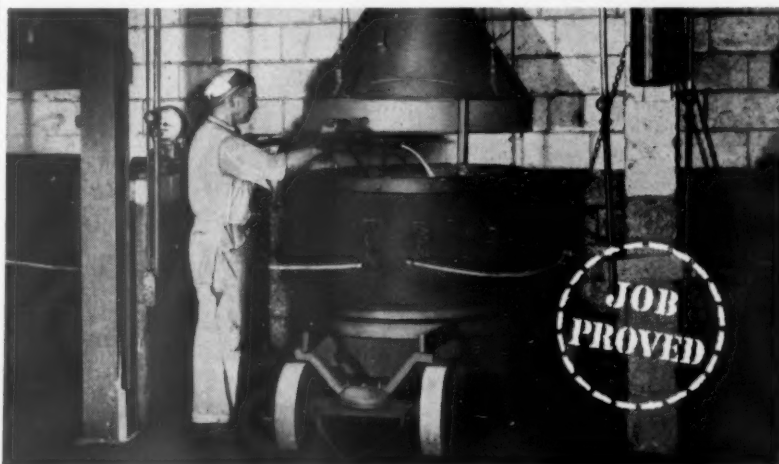
### STABILIZERS

#### For Vinyls

Stabilizers for use in vinyl plastics are known as "Dutch Boy" CS-137 and "Dutch Boy" Barinac. Both are designed for use in clear plastic compounds where exceptional heat and light stability are required.

With the use of "Dutch Boy" CS-137 superior light and heat stability are obtained with complete freedom from staining by sulfur compounds.

"Dutch Boy" Barinac is a new barium ricinoleate for use in products where exceptional clarity and heat stability are important. National Lead Co., 111 Broadway, New York 6, N. Y. PVP—February.



## NO KICK-OUT IN 10 YEARS

### Sun Spirits Solves a Varnish Maker's Problems— No More Gumming in the Cans, No Discoloration

A varnish manufacturer was getting poor results with the solvent he used. Sometimes it worked well; but at other times it gave the varnishes a dark cast. Further, the solvent was unreliable in its action, causing the products to gum in the cans.

Ten years ago, on the advice of a Sun representative, the company changed to Sun Spirits. This solvent—an old reliable in the paint and varnish field—completely eliminated the trouble, and has been used exclusively ever since. The manufacturer finds Sun Spirits always the

same in quality. It never kicks out, and it permits his varnishes to hold their natural color. His products have gained in reputation because of their dependability and uniformity.

Sun Spirits has excellent solvent and wetting-out properties with most natural and synthetic resins. Volatility is carefully controlled to assure reliable drying-time in finished products. Purity is constantly checked to maintain consistent quality. For complete information, call your nearest Sun Office.

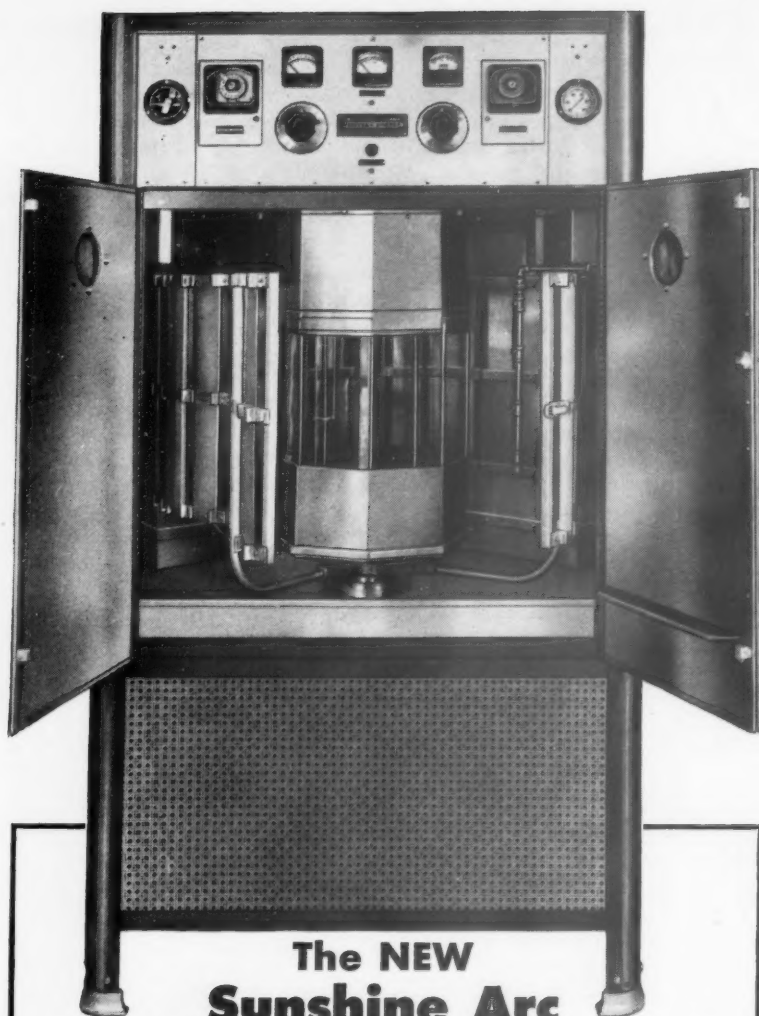
SUN OIL COMPANY • Philadelphia 3, Pa.  
 In Canada: Sun Oil Company, Ltd., Toronto and Montreal

### SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY







**The NEW  
Sunshine Arc  
Weather-Ometer Type XW**  
*A modernized and redesigned version of the open  
flame X-1 and X-1-A Weathering Units*

Many of the control features that have proven their dependability in the Atlas Twin Arc Weather-Ometer have been combined with some features of the original X-1-A weathering unit to make a new Weather-Ometer of advanced design.

In the Type XW a new means of maintaining constant temperature is provided. Far more accurate temperature control is now available.

Radiation is from a Sunshine Carbon Arc which is of the motor-driven, open-flame type. Natural sunlight or intensified ultra-violet radiation is available depending upon the type of carbons and filters used. The light source has been improved to provide 16 hours of continuous operation as well as a number of other added conveniences.

All instruments are located on a convenient control panel, including an arc voltage setting switch and meter, cycle control of light and water spray, 1 to 24 hour shut-down time switch, thermo-regulator and running time meter.

Type XW is fully automatic and may safely be left in unattended operation overnight. If deionized water is to be used, aluminum spray piping can be furnished. The capacity of the stainless steel lined testing chamber is 54 panels. The machine is sturdily constructed and is shipped assembled, ready for connection.

**ATLAS ELECTRIC DEVICES CO.** 361 W. Superior St., Chicago 10, Ill.

**FADE-OMETERS • LAUNDER-OMETERS • WEATHER-OMETERS**

## NEW PRODUCTS

### POWER UNIT

#### Compact

Packaged power unit, called Link-Belt Motogear, consisting of a compact, enclosed helical gear drive with separate standard motor, flexibly coupled and mounted on one welded steel base plate.

A movable plate between motor feet and welded base plate provides for convenient adjustment, should shaft realignment be necessary for any reason.

Link-Belt Motogears are built in a variety of sizes, in double or triple reductions, and in a wide range of ratios and horse powers. Input and output shafts are concentrically in line. Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. PVP—February.

### ACRYLIC POLYMERS

#### Water-Soluble

These modified sodium polyacrylates are water-soluble anionic colloids and are available as clear straw-colored aqueous solutions. They have interesting thickening, suspending, stabilizing and film forming characteristics.

The Company has issued a technical data bulletin describing the acrylic polymers, outlining their properties, and discussing their compatibility with surface active agents and colloids. Copies of this bulletin are available from the Industrial Chemicals Division, American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York. PVP—February.

### PLASTICIZER

#### Ester Type

This plasticizer is the monomeric type with a higher than average molecular weight. This plasticizer is said to have good processing qualities, excellent solvent action, good compatibility, and good light stability. It is recommended for use with vinyl resins processes such as calendaring, plastisol, or organosol coating and dipping. Deecy Products Co., 120 Potter St., Cambridge 42, Mass. PVP—February.





Frederick G. Weigand

#### F. G. Weigand Heads Alkyd Sales at General Electric

Frederick G. Weigand of the General Electric Company's Chemical Department, has been appointed sales manager of alkyd resin products, John A. Zellhoefer, sales manager for the Chemicals Division has announced.

In his new post, Mr. Weigand will have responsibility for the sale of Glyptal, the registered trade mark for G.E.'s alkyd resins, insulating varnishes and compounds, Formvar enamel, plasticizers, and Permafil products. He will have his headquarters at Schenectady, N. Y.

#### National Lead Names Carlton Rose Head of Washington Office

Carlton H. Rose has been named manager of National Lead Company's Washington, D. C., office. He had joined the Washington staff early last year.

Mr. Rose was employed by the company in 1924 as a technical representative of the Pacific Coast Branch. In 1932 he was transferred to the Brooklyn research laboratories as a research chemist and subsequently became head of the pigment and paint department of the laboratories. He was appointed manager of the company's specifications department in 1949 and will continue in this as well as his new capacity.

Admiral Jules James has been assigned to the Washington, D. C., office, effective January 1. Admiral James has been working on special assignments in connection with certain of the company's foreign interests since 1948.

#### American Cyanamid Announces Canadian Distribution

American Cyanamid Company announced that products of its Industrial Chemicals Division and Coating Resins Department of the Plastics and Resins Division, are now being distributed throughout Canada by its subsidiary, North American Cyanamid Limited. Sales offices for these two units are located in Montreal, Quebec (7335 St. Lawrence Blvd.) and in Toronto, Ontario (Royal Bank Building).

#### W. Hensen Appointed Head of Water Paint Section at Dow

Walter A. Hensen has been appointed head of the water paint section of the Dow Chemical Co. Mr. Hensen joined Dow in 1941 and has done extensive work on polymerization and coatings. He will work exclusively with Dow latices as used in latex paints.

#### Dr. E. C. Crittenden Retires From Nat'l Bureau of Stds.

Dr. Eugene C. Crittenden has recently retired as associate director of the National Bureau of Standards. Dr. Crittenden was associated with the Bureau for forty-one years and has been associate director since 1946.

#### V. C. Bidlack Devoting Full Time to Pennsylvania Color

V. C. Bidlack who recently resigned as executive secretary of the Federation of Paint and Varnish Production Clubs will devote full time to the Pennsylvania Color and Chemical Co., Doylestown, Pa.

The company specializes in a complete line of pigment dispersions in nitrocellulose, synthetic and various vehicles for the manufacture of protective coatings, printing inks, plastics and leather. Mr. Bidlack is president and sales manager of the firm.

## *Look what's happened* TO THE **HOT-LACQUER PROCESS**

**EVER SINCE CSC** dedicated the hot-lacquer process (U. S. Patent No. 2,150,096) to the lacquer industry, growth of its use has been outstanding.

Hot lacquer is going on such varied items as automotive parts, furniture, furnaces, tool boxes, wall tile, caskets, pianos, aircraft equipment, scales, and washing machines at the rate of over 250,000 gallons per month!

The many advantages? Preparation time is shortened. And spraying time, too, with fewer coats required. Less tendency to sag. Elimination of blushing. Less spray dust. Less sanding and polishing. Labor and material savings. Higher quality of finish.

To put the money-saving, time-saving hot-lacquer process to work for you, see your lacquer supplier. He's ready to serve you.



INDUSTRIAL CHEMICAL DIVISION  
**COMMERCIAL SOLVENTS CORPORATION**  
17 East 42nd Street, New York 17, N. Y.



### Various Topics to be Discussed At Paint Conference in Toronto

The corrosion and painting problems encountered in the construction of the new Toronto subway will be among the topics scheduled for the 5th Annual Regional Conference of the Protective Coatings Division, The Chemical Institute of Canada, at the Royal York Hotel, Toronto, on March 16. Following this luncheon address by W. H. Paterson, chief engineer of the Toronto Transportation Commission, the delegates will be taken on a conducted tour of the new subway to view the extent of the construction to date.

Other speakers at this one-day Conference will include R. J. Wirshing who will talk on finishing materials and techniques with particular reference to automotive problems. Mr. Wirshing is head of the chemical department of the Research Laboratories, General Motors Corporation, Detroit. Another technical paper will be presented by Harold Watson of Polymer Corporation Limited, Sarnia, whose subject will be "Latices".

Other speakers will survey the recent and future developments in vegetable oil research, and will talk on some aspects of surface preparations.

### Fourth Class Completes Paint Course at Brooklyn Tech



Some 23 students recently completed a course on "Paint Production Techniques" and "Elementary Chemistry of Paint Production" at Brooklyn Technical High School. This course is jointly sponsored by the Technical Training Committee of the New York Paint, Varnish and Lacquer Association (Harold Shakespeare, chairman), and the Education Committee of the New York Paint and Varnish Production Club (Fred Damitz, chairman). This course



### Devoe Reynolds Honors Three With 20 Years of Service

Awards for twenty years' service with the Devoe & Reynolds Co., Inc. were presented recently by Elliot S. Phillips, chairman of the board, to the three men

shown with Mr. Phillips. Reading from left to right, they are: Ed Ziegler, Elliot S. Phillips, Lewis W. Drew, and Adam Pahle.

### Nopco West Coast Plants

Plans for the manufacture of its Industrial chemicals on the West coast are moving rapidly ahead. Two Nopco-owned plants both located in Richmond, Calif. will be utilized in the Pacific Division expansion program. The modern plant at 1141 South 14th St., is being converted to manufacture of stearates and palmitates by Metasap Chemical Company. The second plant, located at 1140 South 10th St., is being fitted for production of the extensive line of chemical processing specialties.

### American Cyanamid Grants Fellowships

American Cyanamid Company announces the granting of thirteen post graduate fellowships and one post doctoral fellowship in the fields of chemistry and chemical engineering for the academic year 1950-51. Each post graduate fellowship provides \$1200 for the student, plus \$300 or the student's full tuition whichever is larger. The post doctoral fellowship carries a stipend of \$3000 for the recipient.

Fellowships have been awarded for the 1950-51 academic year to the following universities: Carnegie Institute of Technology, University of Colorado, Columbia University, Cornell University, Duke University, University of Illinois, Massachusetts Institute of Technology, University of Michigan, University of Notre Dame, Pennsylvania State College, Princeton University, Purdue University, Stanford University and the University of Wisconsin.

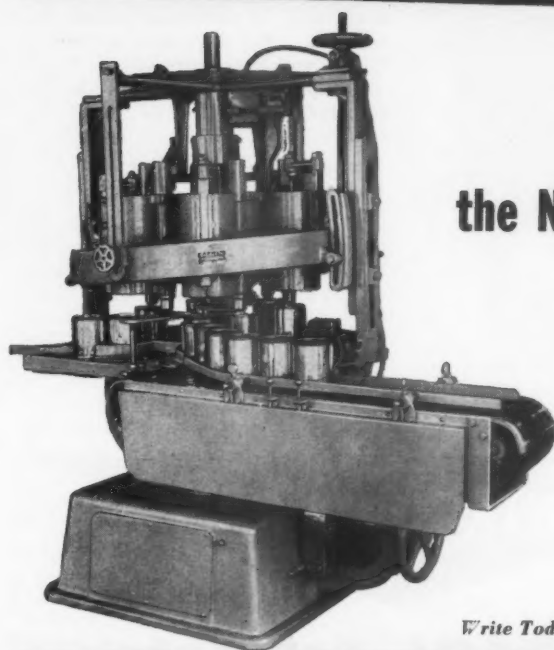
### Heyden Names Peters

Dr. Franklin T. Peters has been appointed Manager of the newly-established Market Development Department, Heyden Chemical Corporation. He comes from the Sales Department of Glyco Products Company. Dr. Arthur L. Davis, transferred from the technical sales department, will be in charge of new products applications.

### Atlas Mineral Products Names Research Chemist

The Atlas Mineral Products Company, Mertztown, Pennsylvania, has announced that Mr. Robert P. Desch has been appointed as a research chemist.

**SAVE LABOR! SAVE TIME! BOOST OUTPUT!**



the NEW **Elgin** HIGH SPEED  
SIX VALVE Rotary  
PAINT FILLER

**SAVES LABOR**—No attendant required when equipped with chute-feed and disc discharge.

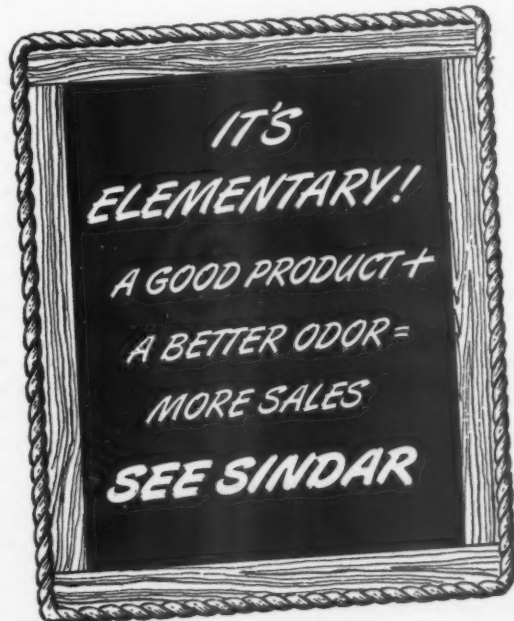
**SAVES TIME**—Remarkably low set-up and change over time. Saves clean-up time.

**BOOSTS OUTPUT** — High speed, accurate deliveries:

Pints 80-100 per minute  
Quarts 60-90 per minute  
Gallons 25-35 per minute  
Filling all sizes from 1/32 gal. to 1 gal.

Write Today for New Folder Illustrating Elgin Equipment; Address: Dept. VC

**ELGIN MANUFACTURING COMPANY • 200 BROOK STREET • ELGIN, ILLINOIS**



**SINDAR**

*Corporation*

Industrial Aromatics and Chemicals

330 West 42nd Street, New York 18, N.Y.

Branches: Philadelphia • Boston • Cincinnati • Detroit  
Chicago • Seattle • Los Angeles • Montreal • Toronto

**THE THREE  
GLIDDEN GUARDSMEN**



**GUAI-A-PHENE  
GLIDCOL-REGULAR  
GLIDCOL-WW**

All for anti-skinning —  
One for every specific requirement

sold by

**E. W. COLLEDGE, G. S. A., Inc.**

52 Vanderbilt Ave.  
New York 17

P. O. Box 389  
Jacksonville, Fla.

25 E. Jackson Blvd.  
Chicago 4, Ill.

2775 East 132nd St. at Shaker Square  
Cleveland 20, Ohio

503 Market Street  
San Francisco 5



## NEWS DIGEST

### New Paint Raw Material Co. Formed

E. M. Pflueger and C. A. Klebsattel formerly of Advance Solvents Chemical Corp. have announced the formation of Naftone, Inc. and will deal in the chemical products of various manufacturers. It is their intention to specialize in raw materials used by the paint and rubber industries. Main offices are located at 745 Fifth Ave., New York 22, N. Y.

### Reconditioning Steel Drums

Acme Steel Drum Co. of Newark, N. J. reconditioned used steel drums for companies shipping a variety of liquids such as paints, chemicals, foods, perfumes, etc. Delivered many times in a battered and rusted condition, the drums are processed rapidly through a highly efficient production line that turns out finished drums at a rate of 330 to 360 per hour. There can be no break-downs for every step in the process requires precise timing . . . equipment and machinery must be tough and trouble-free.



All drums are first washed inside and out with a steam and caustic soda solution. Before the next step they must be drained and completely dried. Small portions of this solution which remain after draining are sucked out by a hose attached to a vacuum line (see photo). Several of these vacuum hose stations are serviced by a single Leiman Vacuum Pump operating at about 8" of vacuum. This excess solution does not pass through this pump but is trapped in reservoir tanks.

After being well dried, the drums are straightened where needed, sandblasted, fitted with new tops and gaskets and painted on the outside. Certain types are given an interior coating for added protection. Conveyors carry the freshly painted drums through electric ovens for quick drying.

### Spray Painting Course

Starting the twenty-sixth year of operation of its School of Spray Painting, the DeVilbiss Company announces the schedule of courses for the first half of 1951. Conforming with their established policy, no charge is made for instruction. Enrolees pay only for meals and lodging while attending the school. Users of DeVilbiss equipment may make application now to enroll their spray operators, foremen and contract painters for

any of the one-week courses offered.

The Training School schedule for contract painters and their representatives offers classes starting February 19 and March 19. Applications should be made as far in advance as possible. Information about the school, or concerning classes for the latter half of 1951, is obtainable from the DeVilbiss Co., Toledo 1, Ohio.

### National Lead Announces Full Line of Paints

A full line of paints, enamels and varnishes has been announced by National Lead Company with additions to its present exterior and interior paints of four enamels, an enamel undercoater and four varnishes. All new products will be sold under the "Dutch Boy" name.

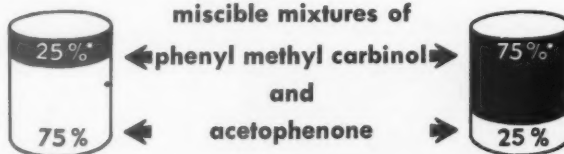
## INTRODUCING

## KETOSOL Solvents

Trade-Mark

"KETOSOL" 25

"KETOSOL" 75



Low price . . . in drums or tank cars . . . pleasant odor . . . high boiling.

#### Solvents for . . .

gums  
sludges  
engine varnishes  
dyes  
adhesives  
coatings  
nitrocellulose  
vinyl resins  
alkyd resins

#### Also for use as . . .

reaction mediums  
extractants  
azeotropic dehydration agents  
intermediates for:  
pharmaceuticals  
dyes  
components in:  
perfumes  
odor-masking agents

For information, write or call the nearest CARBIDE office, requesting data sheets F-7370 and F-6970.

\* Approximate compositions.

"Ketosol" is a trade-mark of Union Carbide and Carbon Corporation.

## CARBIDE AND CARBON CHEMICALS DIVISION

Union Carbide and Carbon Corporation  
30 E. 42nd Street New York 17, N. Y.

In Canada: Carbide and Carbon Chemicals, Limited, Toronto





### Industrial Solvents—2nd Edition

By Ibert Mellan. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. Price \$12.00.

The second edition of this reference is the most comprehensive and up to date treatment of solvents available. The new edition has been completely rewritten and full information on new types of solvents has been added. Obsolete material has been deleted and latest information added.

The extensive data on solvents has been sifted and correlated into a coherent whole. The first few chapters deal with the theoretical aspects of solution. Over 380 solvents are covered. Physical and chemical properties of these solvents are discussed together with their application in various chemical industries. Special attention is given to such factors as evaporation ratio, solubility, phase equilibrium, and dilution ratio.

Of interest to the coatings industry is a discussion on the use of solvents in the formulation paints, varnishes, lacquers and allied products. A chapter on the handling of toxic and inflammable solvents has also been included.

### Colloidal Dispersions

By Earl K. Fischer. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price \$7.50.

A study of the dispersion of finely divided solids in liquid media, this book covers the theory and practice of this chemical process, essential in the manufacture of paint, printing ink, pigments, textiles, ceramics, rubber, and many other industrial products.

The book provides a detailed account of the practical uses of wetting agents, the operation of mixing equipment and dispersion machinery in mills, and a complete, critical discussion on particle size. The author also discusses several topics previously neglected in colloidal literature, including dispersion by non-aqueous liquids and dispersion by phase transfer (the "flushing process").

A leading research worker in the field of surface and colloid chemistry, Dr. Fischer was formerly head of the physical chemistry division of the Institute of Textile Technology. He is currently chief of the Organic Coatings Section of the National Bureau of Standards.

## A New Route to Semi-Alkyds



B-56 Resin offers varnish makers, for the first time, a product that will make a semi-alkyd merely by heating it with a drying oil in the processing kettle. This new resin allows varnish makers to select oil on a price basis, and also offers the greater economy of using unbodied, low-premium grades of oil. The marked sealing properties of some B-56 semi-alkyds offer interesting possibilities in primer-sealers and flat paints. Write for technical information.

HERCULES POWDER COMPANY, 926 Market Street, Wilmington, Delaware



IC51-1

WATERGROUND and MICRO

# MICA

Valuable properties derived from its highly stable, flexible, flaky particles—Reinforcement—Sealing—Lubricity—Elimination of Cracking—Non-reactivity—Film Integrity.

**THE ENGLISH MICA CO.**  
STERLING BUILDING, STAMFORD, CONN.

# TECHNICAL

Bulletins

## PAINT MILLS

The J. M. Lehmann Company, Inc., of Lyndhurst, New Jersey, announces the release of the second new four page folder in the series on their various paint mills. The booklet deals with the Models 661-V and 662-V, giving specifications and features of these machines.

This folder may be obtained on request.

## KEL-F DISPERSIONS

Properties, uses and methods of applying fluorocarbon plastics dispersions are explained in a technical bulletin issued by Chemical Manufacturing Div., M. W. Kellogg Co. P. O. Box 469, Jersey City, N. J. These thermoplastic dispersions are sold under the trade name of "Kel-F".

## LEVEL CONTROLLERS

Line of liquid level controllers are described in a 64-page catalog published by Mason-Neilan Regulator Co., 1190 Adams St., Boston 24, Mass.

## METALLIC SOAPS

The applications of Whittaker Metallic Soaps (Stearates), aluminum, barium, calcium, magnesium, zinc, and zinc palmilate are completely described in this new booklet now being distributed by Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York 13, New York. Tables show the analysis, physical properties and solubility of each product. For those who use metallic soaps, this book contains all the necessary information for selecting the proper product.

## TALC CATALOG

A new book on talc is being distributed by Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York 13, N. Y., long known in industry as "The Talc House." The book contains besides the introduction three sections titled "Uses," "Data," "Specialties."

The introduction clearly describes the various kinds of talc, their sources and their broad usage in all types of industry. All the talcs are indexed by grade number and geographical source.

Section 1 on "Uses" indicates the importance of the various grades of talc to specific industries. A "Talc Use Encyclopedia" suggest the best grade to use for every industrial need.

Numbers specified indicate the talc grade listing in the data section.

Typical physical and chemical properties for the complete listing of Whittaker Talcs are given on separate pages for each grade in numerical order. The list completely describes about one hundred different talcs.

The section on specialties describes various pyrophyllites, soapstones, wonderstone, Softex fillers, special talcs, and Clover Brand Soapstone (Talc) crayons for metal workers.

## ALUMINUM FINISHES

"Finishes for Aluminum" issued by the Reynolds Metal Co., Louisville, Ky. contains basic information on the various processes for applying surface finishes to aluminum. Cleaning treatments, mechanical finishes, electrolytic oxide finishes, organic finishes and other specialized finishes are included.

**Superior!**

**SYLOID\* 308**  
SYNTHETIC SILICA

**FLATTING AGENT**  
—NEW IN ECONOMY,  
EFFICIENCY, UNIFORMITY

SYLOID 308 is a new flattening agent of tremendous importance for flat-finish lacquers. This synthetic silica is inert and insoluble, with particle size minutely controlled, to assure uniformity. Every shipment is exactly like the previous, and so the results are always the same. Use SYLOID 308 and realize new high standards in flattening efficiency, mill room economy, and film characteristics. Use our technical advisory staff. Write for information.

© T. M. Reg. Applied For

Progress through Chemistry

**THE DAVISON CHEMICAL CORPORATION**

**D**

Baltimore 3, Maryland

## EMERY PRODUCTS

Emery Industries, Inc., announces the availability of a descriptive bulletin covering two new Emery products, 12-Hydroxystearic Acid and Hydrogenated Castor Oil. The booklet contains complete specifications, physical and typical characteristics of each product. Also discussed are typical uses and suggested uses based on preliminary experimentation. Also a complete bibliography for each. Emery Industries, Inc., Dept. 5, Carew Tower, Cincinnati 2, Ohio.

## MICA

Mica and mica substitutes are discussed in a recent release issued by the Office of Technical Services of the Department of Commerce. Subjects covered include solid state synthetic mica, research on mica since World War II, the use of mica in cellulose esters, glass and vitreous enamel insulating materials, new uses for mica, etc. Copies of PB 101 142 entitled "Mica and Mica Substitutes" are available from OTS at 50 cents a copy.

## BATTERY SPECS

Gould-National Batteries, Inc., Trenton 7, N. J., announces for the first time nine new two-color, 8½ x 11-inch specification sheets covering "walkie" type batteries. Each data sheet details the battery to be used with a given make of "walkie". Sheets cover batteries for "walkies" manufactured by Automatic, Barrett-Cravens, Lyon-Raymond, Market-Forge, Moto-Truc, Revolvator, Stuebing, Towmotor, and Yale & Towne. Each sheet recommends battery types for light, normal, and heavy duty. A specification table on each sheet designates battery type, capacity, dimensions, and weight for each manufacturer's truck models. Each battery is illustrated by one to five line drawings showing battery layout.

## STAIN OIL

Properties and uses of LX-767 Light Stain Oil are described in Technical Service Report No. 17 published by the Neville Co., Pittsburgh, Pa.

## BUTANEDIOL

Data Bulletin #303, an 8-page folder giving properties, characteristics, uses and handling information for 1,4-butanediol, a valuable addition to the glycol series now available in pilot plant quantities.

The Data Bulletin includes a complete chart of potential reactions for 1,4-butanediol, as well as a complete bibliography of reference material. 1,4-butanediol is a saturated glycol with a molecular weight of 90.1. Its physical properties and highly versatile chemical behavior make it a valuable addition to the already-available glycol series. Antara Product, General Aniline & Film Corp., 444 Madison Ave., New York 22, N. Y.

## COBALT DATA

Bulletin No. 34 contains pertinent information on the cobalt during the current shortage of this strategic metal. Alkyd vehicles, drying oil vehicles, oleoresinous vehicles, varnish vehicles and pure drying oil vehicles are covered in this bulletin. Ferro Chemical Corp., Bedford, Ohio.

## FOR SAMPLE BATCHES AND SMALL ORDERS

Compact . . . versatile . . . economical—here are three compact Ross milling and mixing units to solve your laboratory and small batch problems.

Designed specifically for pilot runs and limited production, these Ross three-roll mills (patents pending) and change can mixer give you maximum efficiency through time-saving operation.



Write today for full data and description.

## CHARLES ROSS & SON COMPANY

Manufacturers of Mixing and Grinding Machinery Since 1869

148-156 CLASSON AVENUE

BROOKLYN 5, N. Y.

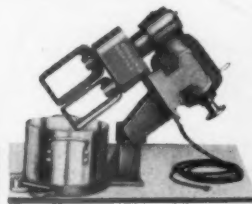
### #152—WATER COOLED 4"x8" THREE ROLL PAINT MILL ¼ H.P. MOTOR

Features new-type simplified roll adjustment and quick release (patents pending). New-type long wearing, self-feeding knife. Highest type chamber-bored rolls. Anti-friction bearings. Gears operate in continuous oil bath. Quickly removable apron; other refinements.



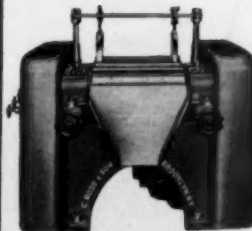
### #130—EL LABORATORY CHANGE CAN MIXER

¼ H.P. variable speed, reversing type motor, operating from light circuit. Capacity—1 pint to 1½ gallons. Cans—seamless, heavily tin-coated 1- or 2-gallon size. Stirrers—double planetary, sweeping bottom and sides.



### #52—WATER COOLED 4½"x10" THREE ROLL PAINT MILL 1 H.P. MOTOR

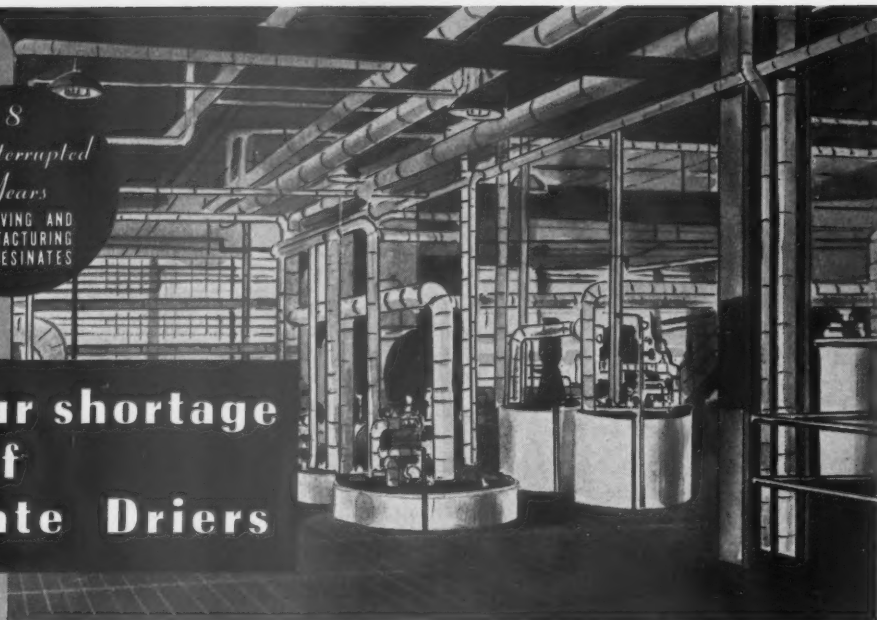
Chamber-bored rolls. Anti-friction bearings. Gears operate in continuous oil bath. Apron quickly removable; other refinements. Heavy cast iron frame.







**Relieve your shortage  
of  
Naphthenate Driers**



*Harshaw's*



## RECENTLY IMPROVED LINORESINATES

Maintaining your maximum production capacity is facilitated by quick adoption of Harshaw's newly improved Linoresinate Driers. Transition from naphthenates to these newly improved Linoresinates can be accomplished with a minimum of interruption.

Because their metal content is identical with that of conventional naphthenates, Harshaw's Linoresinate Driers are worthy replacements for naphthenates in your formulations on a pound for pound basis. Not only does their excellent overall drying performance compare with that of naphthenates, but they have outstanding stability in paint and varnish vehicles, as well as in storage.

Since early in the years of World War II, Harshaw has manufactured and improved its Linoresinate driers. Our manufacturing facilities have been improved too . . . Harshaw Driers are produced with up-to-date equipment in a large new factory.

**Rush me a test sample of** \_\_\_\_\_

My Name \_\_\_\_\_

Co. Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_ State \_\_\_\_\_

**THE HARSHAW CHEMICAL CO.**

1945 East 97th Street, Cleveland 6, Ohio

BRANCHES IN PRINCIPAL CITIES

### HARSHAW'S LINORESINATE DRIERS

COBALT LIQUID 6%

COBALT LIQUID 4%

MANGANESE LIQUID 6%

IRON LIQUID 6%

LEAD LIQUID 24%

LEAD LIQUID 16%

MANGANESE LIQUID 4%

# abstracts



## Effect of Higher Functionality On Pentaerythritol Resins

M. B. Hundert, G. H. Welch, and A. L. Davis, Heyden Chemical Corp., Garfield, N. J. Presented at Div. of Paint, Varnish, and Plastics Chemistry of the American Chemical Society at Chicago Meeting, Sept. 3-8, 1950.

Studies were made on the use of pentaerythritol, dipentaerythritol, and tripentaerythritol in such compositions as tall oil esters, rosin esters (both modified and unmodified), and alkyd resins. These resinous materials resulted in products which had certain advantages over similar compositions made with alcohols of lower functionality. Where modifying agents were required so as to yield comparable film or resin properties, smaller amounts of such agents were used with the higher polyhydric alcohols than with the lower members of the homologous series. In this way, an undesirable characteristic of the modifier, solution instability, may be alleviated, at least in part.

In the case of alkyd resins, it was found that the oil lengths of such compositions vary directly with the functionality of the alcohol, so that long oil alkyds made with tripentaerythritol compare in properties with alkyds of shorter oil length made with pentaerythritol. In a corresponding manner, dipentaerythritol displays a similar position, with respect to pentaerythritol, when compared to the resins obtained from this lowest member of this series of primary alcohols.

## Weathering Tests of Paint Films

Droste, H. Lack und Farbenchemie 1949, 3, 102-106.

The author offers a concise review of the various methods of testing paint and varnish films calculated to approach natural corrosion conditions without relinquishing the easy controllability of laboratory tests disregarding the various natural influences such as light, moisture, heat, cold, atmospheric oxygen and corrosive gases, etc. The author describes the Gardner wheel, the Hoepke weathering apparatus, the methods used by the Government Testing Station of Berlin, and of the German State Railways, as well as those devised by Blom-Keyl, Zeidler-Keyl, Rossmann and Peter.

## Damaged Paint Films & Corrosion Protection

Wuerth, K. Werkstoffe und Korrosion 1950, 1, 20-26.

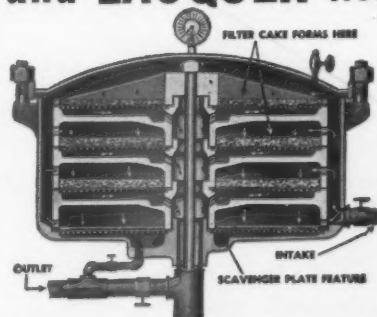
Since damaged protective paint films may be caused by a large number of factors, it is often very difficult to determine the real cause of failure. The uncertainty still prevailing in this respect is aggravated by the lack of methodical observation under practical conditions which is partly due to the greatly varying geographical and local conditions of exposure. The author discusses the following possibilities:

- 1) Condition of the base surfaces (a) chemical effects of constituents of

bases such as the destruction of oil paint films on fresh plaster, b) solution of constituents of the bases by fresh paint films such as penetration of bituminous paints, bleeding-out of pigments, etc., c) technical condition of bases such as rotten plaster, moist wood, insufficiently cleaned and de-rusted iron surfaces etc.).

- 2) Faulty paint materials (a) application of unsuitable paint materials of intrinsically good quality, b) use of faulty prepared paint materials, etc.).
- 3) Faulty application of paints (a) unsuitable consistency, addition of too little or too much dryers, b) faulty applications of the various film layers, etc.).
- 4) External influences (a) weathering under normal or abnormal conditions, b) influence of light such as yellowing of synthetic resin varnishes or bleaching of insufficiently light-fast pigments, c) rusting, d) influences of smoke, industrial gases or chemicals, e) influence of high or low temperatures, rapid temperature changes, moisture, sweat water, etc., f) influence of mould or fungi, g) mechanical influences).
- 5) Faulty construction, etc.

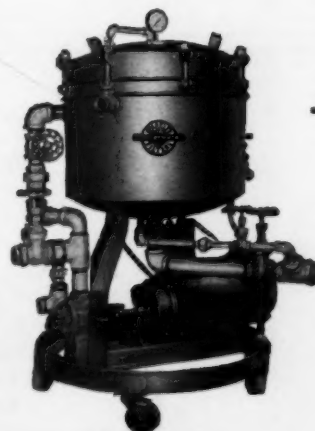
## CLARIFY VARNISH and LACQUER with...



Every varnish maker can (and most of them do) use a Sparkler Filter to improve the clarity and brilliance of varnishes, lacquers and other clear liquids by removing "fish-eyes," skins, and other incidental solids and semi-solids.

We invite correspondence on any special problem related to either of the above processes. Our engineers are ready to give you the benefit of years of experience in this field.

**SPARKLER MANUFACTURING COMPANY, Mundelein, Illinois.**



Model 18-S-12  
Varnish Filter  
in mildsteel  
(steam jacketed)

## CALENDAR OF EVENTS



- Feb. 26-Mar. 3.** A. S. T. M. Committee Week and Spring Meeting. Shoreham Hotel, Washington, D. C.
- Mar. 7-9.** Southern Paint and Varnish Production Club Meeting, Buena Vista Hotel, Biloxi, Miss.
- Mar. 13-16.** Annual Conference of the National Association of Corrosion Engineers, Hotel Statler, New York City, N. Y.
- Mar. 16.** Fifth Annual Regional Conference, Protective Coatings Div., Chemical Institute of Canada, Royal York Hotel, Toronto, Canada.
- April 27-28.** Annual Joint Meeting of Dallas-Houston Paint and Varnish Production Clubs, Shamrock Hotel, Houston, Texas.
- May 24-25.** Society of Plastics Industry Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.
- June 18-22.** A. S. T. M. Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.
- Oct. 22-24.** Thirteenth Annual Forum of the Packaging Institute, Hotel Commodore, New York City, N. Y.
- Oct. 29-31.** National Paint, Varnish and Lacquer Association Convention, Chalfonte-Haddon Hall, Atlantic City, N. J.
- Nov. 1-3.** Federation of Paint and Varnish Production Clubs, Chalfonte-Haddon Hall, Atlantic City, N. J. Paint Industries Show, Oct. 31-Nov. 3.

### Plaskon to Build Alkyd Plant

Chemical Plants Division of Blaw-Knox Company has been engaged by the Plaskon Division of the Libbey-Owens-Ford Glass Company to design and construct a new alkyd resin production plant at Toledo, Ohio.

The plant will employ new processing techniques recently developed in Plaskon's laboratories. It will be air-conditioned with accurate temperature control, and its design will feature provisions for efficient materials handling and allowance for future expansion. It is anticipated that the plant will be in production by March, 1951.

### CLASSIFIED ADVERTISEMENTS

Rates: \$20 per word, except those seeking employment, for which rate is \$10 per word. Minimum: ten words. Address all replies to Box Number, c/o Paint and Varnish Production, 855 Avenue of the Americas, New York 1, New York.

**Chemist:** Excellent opportunity for chemist with three or more years' experience in formulation and development of lacquers and industrial finishes. Well established company in Los Angeles area expanding with good future. Give complete details of record and experience, together with photograph if possible. All replies confidential. Box 106, *Paint and Varnish Production*.

**Sales Representative** to call on paint manufacturers in the Midwest territory. Most attractive offer by an old established manufacturer. Box 107, *Paint and Varnish Production*.

## MICA WATER-GROUND

"At Its Best"

Every Paint manufacturer using Water-Ground Mica should be using "CONCORD" because:

- 1—It is ground exclusively from a clean, white Muscovite Mica scrap imported from India and Africa.
- 2—It is whiter and purer.
- 3—It is strictly competitive in price.

Send for samples and prices

### CONCORD MICA CORPORATION

35 Crescent Street - - - Penacook, N. H.  
"Pioneers in producing Mica for Paint"

## ADVERTISER'S INDEX

American Can Co. ....	Jan.
American Cyanamid Company .....	4
Atlas Electric Devices .....	32
Atlas Powder Company ...	26
Bakelite Division, Union Carbide and Carbon Corporation .....	4th Cover
Barrett Div., Allied Chemical & Dye Corp. ....	23
Binney & Smith Co. 3rd Cover	
Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp. ....	36
E. W. Colledge, G.S.A., Inc.	35
Commercial Solvents Corp. .	33
Concord Mica Corp. ....	42
Continental Can Company ..	Jan.
The Davies Can Co. ....	23
The Davison Chemical Corp.	38
Carl G. Deuber .....	Jan.
Dicalite Division, Great Lakes Carbon Corp. ....	Jan.
Elgin Manufacturing Co. ..	35
The English Mica Co. ....	37
Falk & Co. ....	24
A. Gross & Company ....	20
W. C. Hardesty Co., Inc. ..	16
The Harshaw Chemical Co.	40
Hellige, Inc. ....	24
Hercules Powder Co. ....	37
Lead Industries Association	6
Magnetic Pigment Div., Columbian Carbon Corp. ..	Jan.
McCloskey Varnish Co. ..	Jan.
The Neville Company ....	Jan.
Newport Industries, Inc.	Front Cover
Nuodex Products Co., Inc.	Jan.
Pan American Refining Corp., Pan American Chemicals Div. ....	Jan.
Photovolt Corp. ....	24
Reichhold Chemicals, Inc.	2nd Cover
Charles Ross & Son Company .....	39
Sindar Corp. ....	35
Sparkler Manufacturing Company .....	41
Sun Oil Co. ....	31
Titanium Pigment Corporation .....	3
Troy Engine & Machine Co.	28
Union Carbide and Carbon Corporation, Bakelite Division .....	4
Union Carbide & Carbon Corp., Carbide & Carbon Chemicals Div. ....	36
United Carbon Co., Inc. ..	24
U. S. Industrial Chemicals, Inc. ....	15
U. S. Stoneware Co. ....	Jan.
Velsicol Corp. ....	Jan.
C. K. Williams & Co. ....	Jan.
Wyandotte Chemicals Corporation .....	Jan.



# Jetness to suit your needs

GRADE	Blackness Index	MASS TONE		Loading Capacity	Covering Power	Total Surface Activity	Nature of Surface						
		Particle size microns	Effective Surface Area				Oil Absorption Versus Methion 60°C./100 Gm.	Tearing Strength Index	SPC Absorption Index	pH	Analysis Moisture Free		
			Acres per lb.								Square Meters per gram	Fixed Carbon %	Volatile Matter
Neo Spectra Mark I	240	10	29.4	262	280	95	100	2.9	83.8	16.2			
Neo Spectra Mark II*	220	13	22.5	201	257	95	98	3.0	85.3	14.7			
Super Spectra	216	13	22.5	201	277	95	90	4.2	92.1	7.9			
Neo Spectra Mark III	194	18	16.3	146	180	95	65	2.8	87.0	13.0			
Superba*	191	18	16.3	146	180	95	65	3.2	90.0	10.0			
Excelsior*	166	21	14.0	125	122	100	25	3.7	94.8	5.2			
No. 140 Black	180	24	12.2	109	107	95	17	3.5	93.8	6.2			
Raven 11*	157	25	11.7	105	103	82	3	9.3	99.4	0.6			
Statex B-12*	118	43	6.8	61	85	68	4	10.0	99.2	0.8			
Statex*	95	50	5.9	53	47	50	2	10.7	99.5	0.5			
Molacce*	58	83	3.5	31									

\*Also manufactured in Beaded form

\*Also manufactured in Beaded form

In this list is a carbon  
to meet your blackness requirement



• COLUMBIAN COLLOIDS •



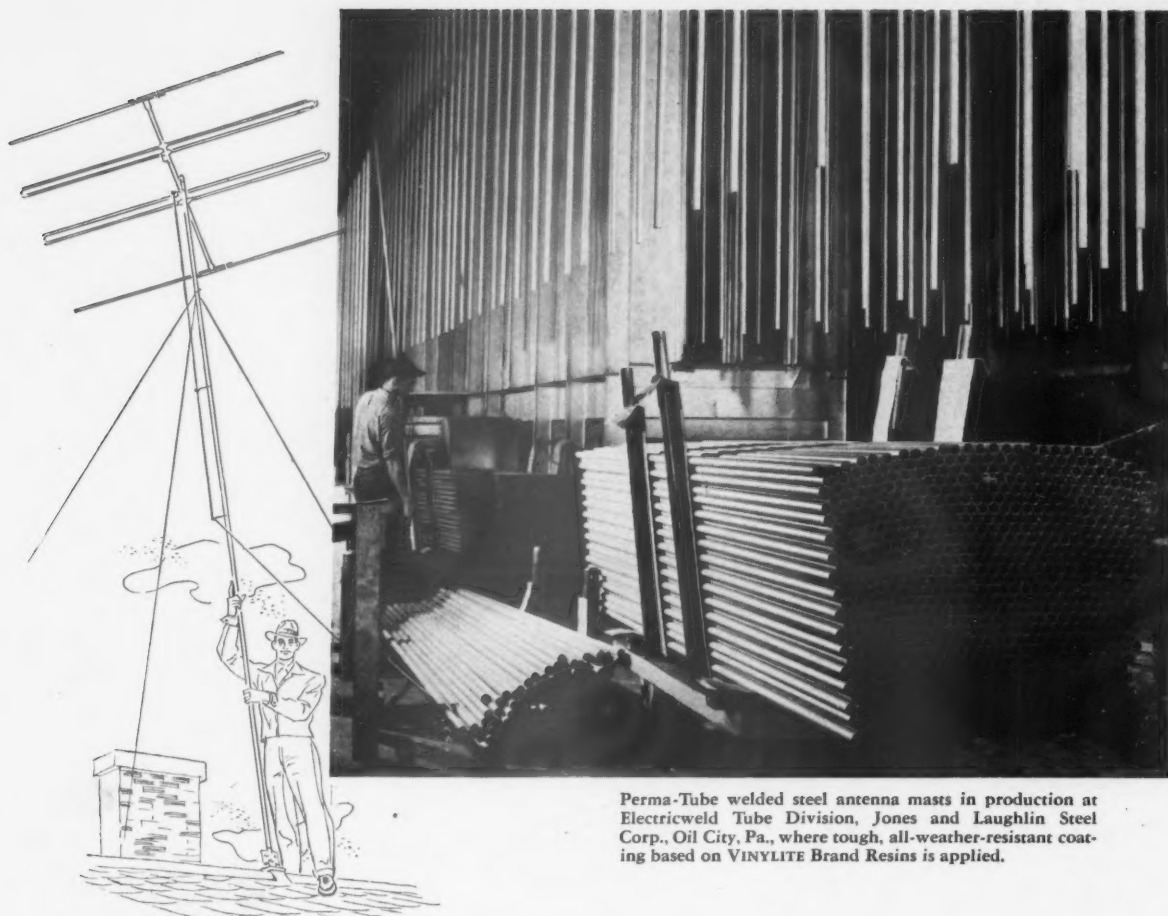
**COLUMBIAN CARBON CO. - BINNEY & SMITH CO.**

MANUFACTURER

DISTRIBUTOR

## DISTRIBUTORS OF BINNEY & SMITH CO. PRODUCTS

Akron, Binne. & Smith Co.; Boston, Binney & Smith Co.; Chicago, Binney & Smith Co.; Dallas, Roy A. Ribelin Distributing Co.; Detroit, Binney & Smith Co.; Houston, Roy A. Ribelin Distributing Co.; Kansas City, Mo., Abner Hood Chemical Co.; Los Angeles, Martin, Hoyt & Milne, Inc.; Louisville, Wm. B. Tabler Co.; Montreal, Binney & Smith Ltd.; Philadelphia, Binney & Smith Co.; St. Louis, J. E. Niehaus & Co.; St. Paul, Worum Chemical Co.; San Francisco, Martin, Hoyt & Milne, Inc.; Toronto, Binney & Smith Ltd.



Perma-Tube welded steel antenna masts in production at Electricweld Tube Division, Jones and Laughlin Steel Corp., Oil City, Pa., where tough, all-weather-resistant coating based on VINYLITE Brand Resins is applied.

## YOU Are Steel's Number 1 Doctor!

YES, the day to day health and the long life of steel and many other metals are very much in your hands. And you can formulate steel's Number 1 medicine with VINYLITE Brand Resins!

Take this "Perma-Tube" steel tubing. A finish dip-coating based on VINYLITE Brand Resins protects it with a lasting bond of high integrity.

And of utmost importance, the VINYLITE Resin-base finish resists weather, moisture, sunlight, salt and corrosive atmospheres. The tubes can be bent and fabricated by conventional methods—without harming the finish. They have withstood 2000 hours of salt spray tests, and accelerated weather tests equal to five years in the open, without failure.

VINYLITE Resin-base coatings are strongly resistant to water, oils,

greases, alkalis, and most strong acids. They are widely used on storage tanks and pipes, off-shore drill rigs, and equipment, in acid and other chemical plants, and in dairies. They protect contents from containers, and containers from their contents.



Enlarged ends of antenna mast sections fit snugly over reduced ends to speed installation. There is no risk of chipping the strongly bonded VINYLITE Resin-based coating.

A letter will bring you technical information on or regarding formulations using VINYLITE Brand Resins, or a Bakelite Division representative to discuss your problems. Simply write Dept. KC-75.

Data on tubing coatings courtesy Thompson and Company, Oakmont, Pa.



BAKELITE DIVISION

*Union Carbide and Carbon Corporation*

30 East 42nd Street, New York 17, N. Y.

